RAILROAD GAZETTE

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Contributions

Improvement of Hand Signaling.

TO THE EDITOR OF THE RAILROAD GAZETTE.

I have read your article on hand signaling (Oct. 11) with a great deal of interest. It should invite discussion and therefore be of value, and it may produce good results.

But while a more strict enforcement of the standard code is desirable, it does not seem necessary, in my opinion, either to change the form of the motions as prescribed therein, or to provide additional signals. The standard code provides signals for "stop," "proceed," "back," "train has parted," "apply air-brakes," and "release air-brakes." Of these, the first three may be termed elementary; they cover all the possible movements of a train. "Ease ahead," "ease back" and "back up to couple," are simply modifications of these primary movements, executed with varying degrees of promptness or speed which may be readily graduated as the three signals, designated as "elementary" are gently, forcibly or violently given. Some intelligence and knowledge of local conditions on the part of the train and engine crews is presumed in the transmission, interpretation and execution of these signals.

"The use of unauthorized hand motions and the slovenly execution of those which do have some semblance of being regular signals," is a matter of discipline, rather than the fault of the signals. Aside from the seeming superfluity of additional signals, any extension of the present code would materially increase the difficulty of training new men and offer a still more extensive field for irregularities in their execution.

I notice that the quoted letter from Kansas City mentions a number of movements which have been provided for and then speaks of "others too numerous to mention," from which I judge that they are too numerous for use. It is now almost impossible, in the investigation of an accident, to establish responsibility when the question of signals is involved. To add more signals would add more complications. There would seem to be enough signals to enable trains of one company to be run over the lines of another.

As regards the need of improvement in making motion signals for passenger trains, the true remedy is to have motion signals given on passenger trains only when absolutely necessary; they should be avoided when at all possible and air signals depended upon. H. S. W.

[From a General Superintendent in the West.]

TO THE EDITOR OF THE RAILROAD GAZETTE.

I was glad to see your editorial on hand signaling. The suggestions which it contains are both timely and sensible. I have felt for some time that the standard code signals were extremely defective. A little earnest consideration of their imperfections on the part of the committee could hardly fail to show features in which they could be corrected, to the advantage of all concerned. Some of the signals and the rules describing them are decidedly inferior to the old rules and practice which were in vogue in the East 20 years ago.

You do well, also, to bring out the fact that the standard code is getting away from its original mission—that it is coming to be no longer a code of definite instructions. A code of principles is good in its way. A code of explicit rules is not only good, but is an absolute necessity. Let us not combine the two and thus impair, if not spoil, both. The insufficiency of the present standard code is illustrated by the way in which Rule 99, the familiar flagging rule, is treated. Any one who wishes to put his discipline in the most effective shape; who wishes to facilitate the work of the trainmaster in holding conductors and flagmen to their duty, wants a rule which trainmen can study for instruction; one by which they can familiarize themselves with the requirements of the flagman's position; but, to have such a rule, each superintendent or general manager must get up one for himself. A prominent Western road has just got out a new rule book and No. 99 fills 68 lines; besides which there are Rules 99a and 99b, filling 36 lines more; or a total of 104 lines, in place of the nine lines in the standard code. Why should not so important a rule be made standard by the Association? What specific fault has been found with the 10 years' experience (1889-1899) that was had with the standard flagging rule? I do not recall that the committee ever laid before the Association any well defined reason for emasculating the rule. X. V.

[From a General Superintendent in the East.]

TO THE EDITOR OF THE RAILROAD GAZETTE.

Allow me to express my appreciation of your article [Oct. 11] on hand signaling. The points which you have stated are exactly in accordance with my experience and I agree with the views which you express. You have elucidated an important subject very thoroughly and it is to be hoped that an interest may be aroused which will lead to improvement. Under present conditions it is a very difficult task to get employees to give standard signals in accordance with rules, and it is impossible to keep them from introducing other signals which are largely localized. X. Y. Z.

[Some Difficulties.]

TO THE EDITOR OF THE RAILROAD GAZETTE.

The irregularities mentioned in your editorial article about hand signaling are, indeed, widespread, and are a matter of common observation every day. At a large city in Massachusetts the yardmen could have been seen, not long ago, using the old up-and-down motion for "stop," though it may be that they have been overtaken by an aggressive new superintendent by this time. I find by inquiry that the difficulty is not confined to any one locality, so you must not take this letter as a slur on the old Bay State. The question, What are you going to do about it? is not an easy one to answer. Many of the signals improvised by yardmen are not only local in their nature but rightly should be local; such for example as a conventional combination of a shout and a hand motion to tell the engineer to start for the A. B. & C. yard; or to set some cars on the saw-mill company's farther siding. Again, a motion to go through a certain crossover, or two crossovers, may well be general (not local) in the sense that it can be used in a number of different cities, while yet it cannot be *defined* in general terms.

It seems to me that the most profitable direction in which a division superintendent can bestir himself for the purpose of eliminating defective or dangerous practice is to begin to make yardmen live up to those rules which are already on the books. By taking up the subject in this way he will be enabled to see what opportunity there is for going farther. For myself, I confess that I should like to have the benefit of more extended consultation with officers of other roads, who may have run up against the same difficulties that I have, before I take the next step.

As a slight contribution to the discussion, permit me to remind your readers that on one road, the New York, New Haven & Hartford, the rule which gives the hand motions to stop, go ahead and back has appended to it a note requiring that so far as possible the rapidity and extent of the signals shall indicate the manner in which the train should be stopped or moved. This is the only road where I have seen this provision. In the standard code there is a clause of similar import in the rule concerning locomotive whistle signals, but none for the hand signals. E. & N. A.

White Handkerchiefs.

New Haven, Conn., Oct. 26, 1901.

TO THE EDITOR OF THE RAILROAD GAZETTE.

One of the most commonly violated rules in the train service is that which prescribes the hand motion for daylight use in signaling "go ahead." I have read with great interest your article of Oct. 11 on the prevalence of slovenly practice among trainmen in giving motion signals, and must confess that the problem of improving yard signaling looks, to me, rather discouraging; to infuse good discipline into the happy-go-lucky "switchman" in yard service would be a tedious task; but the go-ahead motion, used on all trains, passenger, freight and switching, is peculiar in that it is constantly violated, while yet it is one which would be the easiest to put right. Why cannot the American Railway Association correct it at one stroke?

The Association ought, in all reason, to cure this fault, if it can be cured, for it was the action of the Association, chiefly, which produced it. In their unduly strenuous pursuit of impracticable uniformity, they determined that the day motion for go ahead should be the same as that which is used at night, whereas the problem is so different by daylight that there is no reason whatever in making the two signals alike. It would be just as reasonable to say that as the semaphore, in the dark, presents a red or a white disk (light) to the engineman, therefore the daylight signal should be a red or a white disk of 8 in. diam. Everybody knows that a semaphore arm 4 ft. long is immeasurably superior to a disk; and it is equally clear that a slight motion of the uplifted hand from side to side—a mere wiggle, if I may use a colloquialism—such as every trainman is familiar with, is far more effective than to move the hand, or even the whole arm, in a vertical plane, which is so related to the engineman that he cannot see the motion at all. This is not an exaggerated characterization. To move your hand or arm up and down in the same way that you move a lantern up and down—and that is what the rule requires—you move it in the way best adapted to *prevent* the engineman from seeing the motion. If he sees the motion at all it is either because he is very near to you or because you deviate from the rule by causing the hand to deviate a little from a vertical line.

A conductor can, of course, extend his arm at right angles to the track (crosswise of the road) and then move his hand up and down; but this is a clumsy signal, because the motion of the hand is in a circle, the radius of which is described by the arm from the shoulder to the hand, the shoulder being the center. The motion is not sufficiently distinct from the "back up" motion; and if the hand is swung a little too low the motion tends toward a horizontal line and toward conflict with the stop motion.

The signal can be made effective and unobjectionable by either one of two expedients. The unnecessary theory of uniformity with the night signal can be abandoned and the old-fashioned wave of the uplifted hand adopted, or the motion of the hand up and down, as now prescribed, can be made really uniform with the night motion by using a handkerchief to take the place of the lantern. The man should, of course, face toward the engine, and hold his hand in front of his body.

The time-honored wave of the hand seems to come natural to all Yankees and I never heard of any objection to it. I do not recollect any rule-book in which it has been described in lucid language, but it is easy enough to describe with the aid of a drawing—as the present standard hand signals are described. In words the signal may be defined as holding one arm vertically upward and vibrating the hand slightly from side to side a few times (the man giving the signal being required to stand facing the person to whom he is giving it).

But what is the matter with a handkerchief? If any reader of the *Railroad Gazette* feels disposed to indorse my views, but is afraid to try to change the laws of the Medes and Persians who made those artistic pictures in the standard code, I would urge him to advocate the use of white handkerchiefs. Every trainman ought to carry one (and a bright red one, also). A trainmaster who should give his trainmen a hundred dollars' worth of new white handkerchiefs next Christmas would be able to improve his hand signaling materially at once. The efficiency of a light as a signal at night is due to its brilliant contrast with its black background. Within limits it is more distinct than a day signal of shape or color. Now, a white handkerchief, making for the engineer the best possible contrast with the background, affords the most effective means of giving to the day signal the best features of the night signal.

If you want to make use of both of the ideas which I have here presented there is an excellent opportunity to do so. The uplifted arm, with the slight waving of the hand, could be the go-ahead motion for switching movements, and the vertical motion with the handkerchief could mean "proceed to the next station," or, as the English say, the "right-away" signal. E. C. B.

Massachusetts Commissioners' Decision on Coal Rates to Brockton.

This complaint is brought by Mayor Charles H. Coulter and others, charging that the rate for carrying coal from tidewater to Brockton on the New York, New Haven & Hartford Railroad is excessive. The complaint is brought under section 16, chapter 112, of the Public Statutes, which provides that the Board, whenever it deems that "a change in rates of fare for transporting freight or passengers" is "reasonable and expedient," shall, in writing, inform the corporation of the changes which are considered proper. This law was enacted in 1869 as a part of the act establishing the Commission. The duty of the Board under it was defined in the Board's decision of a case which arose in 1871. It was said that the question to be decided was either "whether a rate was excessive as compared with charges for other similar service," or whether there were "exceptional reasons" for the performance of particular service at an unusually low rate. "This Board cannot decide that a charge, not materially in excess of the average charge on similar articles, is unreasonable unless it is prepared to remodel the whole tariff. . . . The Commissioners must in every case not based on general complaints of extortion,

assume that the average charge on similar service is reasonable." These views have been repeatedly reaffirmed. "The question is not whether we consider the rate as exactly the right one, but whether it is so unreasonably high, so palpably out of proportion to the service rendered, that we should recommend a reduction, and in case the recommendation is not complied with, follow it with a call upon the General Court to revise it by special legislation." The distinction between the work of this Board and that of a Board which makes rates and revises tariffs has always been clearly drawn.

The Board does not attempt to divide with the Directors responsibility for railroad management. It is not its function to correct, if it could, errors of judgment in the determination of purely business questions. Such a task is impracticable without the knowledge and opportunity that comes only from the entire control of affairs. The fixing of rates by public authority belongs with public ownership. It has been the policy of this State, in connection with the private ownership of railroads, to establish a supervision that shall leave the business management of the roads to the owners unhampered as long as it is conducted in a reasonable manner. To the extent that the restrictive power of the Board over issues of stock and bonds, and in matters affecting the public safety, is a departure from this policy, there are obvious reasons for the different rule.

The Legislature has declared its power to revise and alter railroad tariffs. It has never, however, attempted to use this power save under a few exceptional statutes, like those relating to workingmen's trains [to and from Boston] which were enacted to accomplish more, but have actually accomplished less than what has been usually secured through the recommendatory power of the Board.

It is with unreasonable rates then, any rate that works an unjust discrimination, that we have to deal. The question now before us is whether the coal rate from tidewater to Brockton is an unjust discrimination. For many years this rate over the Old Colony was one dollar a ton. In February, 1898, at the request of the parties interested, the New York, New Haven & Hartford, then operating the railroad under its lease, reduced the rate to 85 cents. In May, 1898, a petition was filed with this Board, complaining that the rate of 85 cents was excessive. After a number of hearings, the petition was, in February, 1899, withdrawn, an agreement having been reached between the parties, in accordance with which the rate was reduced to 75 cents. This is the rate now under consideration.

The complainants have called attention to the tariffs in force upon other railroads, and the railroad has furnished a table of rates on its own and other roads. An examination of all these and other charges has satisfied us that the Brockton rate, compared with other rates for transportation of coal under like conditions, is at least as low as the rate usually charged for such service.

The complainants also ask a reduction upon the ground that the cost of this particular service would warrant a lower charge. To support this view, interrogatories were addressed to the railroad company inquiring into the details of cost and methods of transporting coal to Brockton. The answers to these interrogatories show the difficulties of attempting to apportion accurately the cost of transportation of a particular article over a part of a complicated railroad system. Cost is an important factor in dealing with the entire tariff of a company, or a general complaint of extortionate practice in attempting to secure for railroad capital more than a reasonable return upon the investment. But the question here is whether a particular rate is unreasonable. Upon this issue, the figures and estimates presented furnish no material aid. The question must be decided as like questions have been decided from time to time, through the test of comparison with other rates.

Counsel for the company has presented in his brief an exhaustive review of the authorities upon this point. From whatever side the question is approached, whether it be that of the railroad, or the shipper, or the student of economics, or the general public, there is substantially but one opinion. We quote a few from the many statements of this opinion.

"It is a safe conclusion that an element of joint cost appears in almost every item of a railroad's outgo, and that the proportion of expense which can be specifically assigned to any one consignment of freight or any one batch of passengers is an insignificant fraction of the whole. From this fact of preponderating joint cost it follows that railroad rates are permanently affected by demand, and that they cannot be based on any analysis of cost of service."—*Taussig, "Contribution to the Theory of Railway Rates," 1890.*

"Mr. H. C. Adams, statistician of the Interstate Commerce Commission, approved this conclusion, saying that 'to say that it is possible to assign cost to a particular traffic is an absurdity.'"

"Little can be said in favor of the cost of service theory. . . . To attempt to fix a rate on a particular commodity in conformity with the entire cost of handling that commodity is plainly impossible."—*Dixon, "State Railroad Control," 1896.*

H. T. Newcomb, chief of the section of freight rates in the division of statistics of the United States Department of Agriculture, testifying before the Industrial Commission in March, 1899, said: "Rates of transportation are unjust or just in comparison with other charges. There is no such thing as a rate which is excessive in itself. The only study of railway charges must be a comparative study; the relations among charges on similar products and of particular charges to the total earnings of the railway itself. . . . Each of our railways has a great complex of articles that make up its traffic. You must study the rates comparatively. You cannot study them alone."—*Report of Industrial Commission, 1900, Vol. iv, p. 99.*

"There was never a more mistaken idea than the idea that rates would be reduced if they were based upon the cost of service. The principle keeps rates up. If it is strictly applied it makes it necessary that each item of business should pay its share of the fixed charges. A great deal of business, which would pay much less than its share of the fixed charges (though still giving a slight profit above train and station charges) is thus lost. This is bad for the railroads, bad for the shipper and bad for the prospect of low average rates."—*Hadley, "Railroad Transportation," 1885, p. 250.*

"The cost of service principle is neither practiced nor practicable. The attempt to base rates solely on cost is a pure chimera. Well-nigh every expert, whether scientist, official or legislator, and every practical commission, from the early English to the late Italian and American, absolutely discards it as a practice."—*Seligman, "Railway Tariffs, and the Interstate Commerce Law," Political Science Quarterly, Vol. ii, Nos. 2, 3.*

"The movement of a commodity by rail is determined by considerations wholly independent of and not affected by the cost of the service to be performed."—*Cullom Committee Report, p. 184.*

The present case furnishes a good illustration of the perplexities that beset one in attempting to distribute the cost of transportation. Coal is carried to Brockton from three points, from Fall River, from New Bedford, and from Providence; it is carried at irregular intervals in varying quantities and with other freight; and under an arrangement for retail consignments. Again, the items of joint cost include the extraordinary expenditure of between one and two millions of dollars in the abolition of grade crossings, and the furnishing of station facilities in Brockton; an item that might be a troublesome one from the standpoint of Brockton interests, if the theory of cost and profit of separate service is to determine freight charges.

A rate in the nature of a charge per ton-mile was also advocated. Aside from difficulties already noted, this plan if it were an advantage to Brockton would admittedly work to the disadvantage of neighboring towns now in the same group and now having the benefit of the same rate as Brockton.

Nor have there been shown any peculiar conditions which would warrant upon exceptional grounds an unusually low rate. The item of freight upon coal is a comparatively small one in the cost of the industries carried on here. Nor do the previous reductions in the rate upon coal seem to have brought about any increase in profits to consumers in general, or any increased traffic to the company. A commodity rate, on the other hand, is now in force upon the principal manufacturing products of the city, affording a lower rate than would usually be charged in recognition of the business reasons that call for and justify it. The application of this principle of trade, an outgrowth of commercial success which gives to shipper and carrier alike a profit tempered to present conditions and stimulates to further development an important industry to the mutual advantage of both, is far better adapted to the needs of Brockton than any hard and fast rule established upon the basis of particular cost of service or rate per ton-mile.

Examined, therefore, in the light of all the suggestions made and facts presented, we think the claim that the freight rate upon coal from tidewater to Brockton is an unjust discrimination and unreasonable, fails of proof; and we must decline to make the recommendation that it be reduced.—James P. Jackson, George W. Bishop, Clinton White, Commissioners.

The New Shops of the Union Switch & Signal Company.

The large new shops of the Union Switch & Signal Co., at Swissvale, Pa., which have been under construction for nearly two years, are now about completed.

The land owned by the company at Swissvale aggregates 10½ acres. Of this 4½ acres are covered by the following buildings:

Main shop	300 ft. x 565 ft.
Power house	50 ft. x 95 ft.
Lumber sheds	75 ft. x 180 ft.
Office building	60 ft. x 85 ft.

We give herewith perspective outside and inside views of the shops, and later expect to describe them more in

Fig. 1.—Shops of the Union Switch & Signal Co., Swissvale, Pa., Looking East.

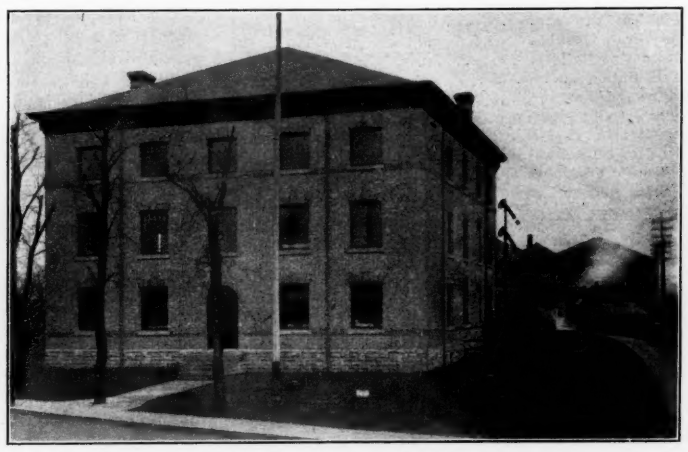


Fig. 2.—Office of the Union Switch & Signal Co., Swissvale, Pa.

detail; and in connection with the view of the office building, now given, we have the following description of the building, from an officer of the company.

The office building is of brick, 60 ft. x 85 ft., three stories high, with a basement. In the basement are a kitchen and a dining room, in which the office force and heads of shop departments are served luncheon at noon. Here is also a large vault where obsolete matter from the office files is stored. In the basement are also washrooms, lavatory and a general storeroom, and a steam heater for the building.

The first floor is devoted to the general offices, which are finished in quartered oak and handsomely furnished. Here the General Manager and his assistant, the Secretary-Treasurer, Auditing and Accounting Departments, the Chief Engineer and the Purchasing Agent are located.

The large office of the Accounting Department includes a fire-proof vault of capacious dimensions, which is elaborately fitted with metal file cabinets and a modern safe.

The second floor is devoted to engineering details exclusively. The work on this floor is done by a force of 15 draftsmen, in a well-lighted room 40 ft. x 60 ft. Here also are located the offices of the Assistant Chief Engineer, the specification department, the department of orders, the advertising department, and the blue-printing quarters.

All the blue-prints are made by electric light, in a special apparatus designed for the purpose. This consists of a vertical glass cylinder 3 ft. in diameter and 5 ft. high, which is mounted in a frame fitted with rollers so that it may be rotated about a fixed center. Suspended on this center line and over the cylinder is a 1,100 watt arc lamp that, by an escapement and system of pulleys, is permitted to gradually descend through the center of the cylinder to the floor during printing. The tracing to be printed is laid on the sensitized paper and both are then placed flatly around the outer surface of the glass cylinder, the tracing being next to the glass. Here they are held firmly in place by a fabric curtain, one vertical side only of which is permanently secured to the cylinder frame, the other side being, while under tension, clamped to the opposite side of the frame after the tracing and papers are in position. The lamp is then permitted to descend slowly, the center of the light coinciding always with the center line of the cylinder and thus maintaining a uniform intensity of light at all points on the tracing

that are at a level with the arc. Those lines that are above or below the level of the lamp are naturally less intense, and were it not for the descent of the light through a distance corresponding with the height of the tracing, the sensitized paper would not be uniformly affected. As it is the prints are very uniform in tone. They require an exposure of slightly less than a minute, while equally senstitive paper printed by sunlight, through a Pittsburgh atmosphere, requires from 10 to 12 minutes.

The process can be used for printing by night as well as by day and is indispensable to the present activity at Swissvale.

The many tracings, patents and engineering details that form the backbone of the company's business are stored in a fire-proof vault, on the second floor, opening into the drafting room.

It is the third floor of this building that constitutes its chief novelty. Here are arranged about the room, which is 60 ft. x 85 ft., the full size of the building, many models and illustrations of devices used in the signaling world to-day, as well as many which have been abandoned in the march of progress during the past 25 years.

Many of these models are in operation and all of them employ full-sized appliances, these being used to avoid the unsatisfactory results which miniature exhibits frequently give. While this exhibit is far from complete, it represents at the present time one of the most comprehensive studies to be found of present and past signaling, and the company proposes to go on and develop this "museum" into one of the most attractive and instructive signal exhibits that can be made.

The office building has been in commission slightly over a year. The shops are only now receiving their finishing touches. We hope to give not only a description of the shops, but also of the interesting devices on exhibition in the office museum.

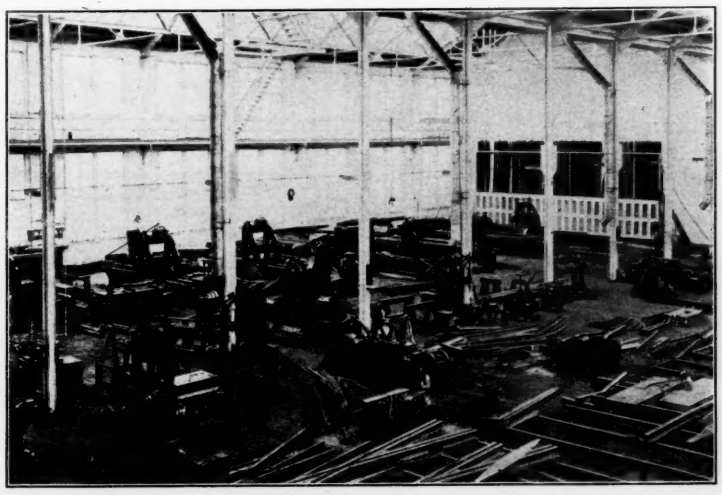


Fig. 3.—Switch and Frog Shop, Swissvale.

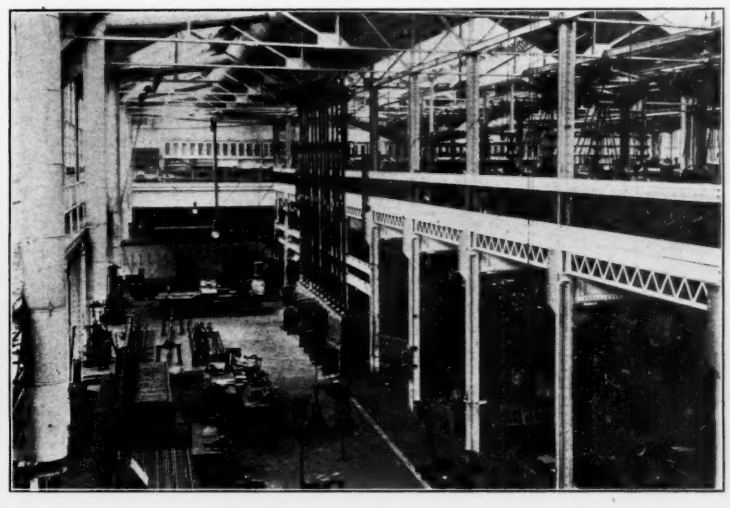


Fig. 4.—Part of Machine Shop.

Ventilating Pipes Shown at the Left.

Suggestions for Road-Building in Tennessee.*

. . . To make a good road out of an existing bad one is often a more difficult task than to build an entirely new one. . . . My belief is that all first-class roads should have no gradient of more than 3 per cent., which means a rise of 3 ft. in 100 ft., except in very mountainous districts, where they might be allowed to go to a maximum of 6 per cent. The heaviest railroad grade in the State of which I am aware is 4 per cent., and pusher engines are employed here. If a road has all its grades but one a 3 per cent. grade, and that one is 6 per cent., unless the wagoner can double his team at the 6 per cent. hill, he will be unable to haul over the entire line a larger load than he can pull up the 6 per cent. grade. It often happens, though, that most of the travel is local, and many loads will traverse a part of the road without going over the 6 per cent. grade. The practice, then, should be that wherever first-class roads have grades of more than 3 per cent., they should be relocated or graded so as to reduce them to that figure, provided the expense is not so great as to make it impracticable. The distance might be greatly increased with economy, in most instances, where grades are thereby reduced. There are many unnecessary crooks and turns in all our roads, which should be taken out in order to reduce the distance traveled and the mileage maintained.

The gradient on second-class roads should not exceed 5 per cent. Third-class roads should have gradients of not exceeding 6 per cent., with 9 per cent. for extreme cases. Fourth-class roads are usually neighborhood roads, and travel over them is so light that heavy expenditure is out of consideration. . . . It is bad policy to undertake to work a wider road than the travel requires, or to make a narrow road answer the purpose of a wide one. . . . I would strongly recommend that property owners be induced to set out trees on the margin of all roads along their property front. . . .

The stone selected for road making should be the hardest obtainable. The softer stones might be used at the bottom of the road, but the surface should be hard. The present practice, where used at all, is generally to purchase the rock broken by the bushel or perch. The breaker, who does it all by hand selects the softest and rottenest limestone he can get because it breaks easily. Hand-broken stone is believed by some to be the best, but I do not believe it equal to crushed rock. It should be broken or crushed so that no piece shall have a greater dimension than 2 in. It should not be screened. The practice of railroads is to screen their ballast because they need a porous roadbed. With most of our roads a layer of stone 6 in. thick will be sufficient, but on those of very heavy traffic it must go to 10 in. Wherever new metalling is put on an old road that has been macadamized and needs repairs the old metal should be first loosened up so that a perfect union between the old and new metal will be effected.

The first requisite of all good roads is drainage. . . . The stone just as it comes from the crusher should be uniformly spread on the dry earth. If the metalling is to be more than 6 in. thick it should be put on in layers. The top should have a light coating of small, clean gravel spread over it, and afterwards it should be sprinkled lightly and thoroughly rolled with wide-tired loaded wagons or narrow-tired road rollers. Wide rollers are a mistake. They bridge over concealed voids which afterwards become holes. With narrow rollers these can all be found and repaired at once. McAdam's practice was to put the stone on in layers of 4 in. and turn the traffic over it. If our traffic was sufficient this would be best, but our experience is that when traffic is turned over the rough stone with no "blinding" or previous rolling, the wagons soon make ruts and the road never becomes smooth. Loose stones continually roll about on it, becoming more rounded every day. Clean, sharp gravel (chert) will do as well as broken stones. Gravel which has been rounded by the water is not so good. Excellent flint gravel is found in nearly all our streams, especially those having their sources in the Highland Rim. . . .

The total mileage of public roads, not including toll pikes, in the State is about 40,000. I am not informed as to the mileage of the classes, but assuming that there are an equal number of each class, the approximate total cost of the reconstruction of all the roads in the State would be as follows: Those 20 ft. wide, $2,426,000; 16 ft. wide, $1,980,000; 12 ft., $1,486,000; 8 ft., $990,000; total, $6,882,000. My estimates are not on the basis of maximum widths as fixed by the present law, but on widths likely to be used in rural districts.

This appears to be a large sum, but when you consider that we squander annually in this State about $800,000 in money or alleged labor, it would take only about eight and one-half years, at the present rate of taxation, to accomplish it. No allowance, however, is here made for the keeping of bridges and maintaining the old roads in passable condition while the improvements are in progress.

We now spend annually about $200 a mile in money and labor tax for this purpose and do little else but keep them passable. Of the 160,000 men who annually work the road 11,000 are overseers. Their wages are $1 per day for all days worked over and above the actual number assessed to the road hands. The law requires that they shall only have charge of portions of roads on or near which they live, and that the hands worked shall also live on or near the road. The work may be done at any time the overseer may choose. . . .

What we need is vigorous and constant supervision of the road work by men who understand it and who have no quarrels with their neighbors to shun. The same vigorous, constant and watchful administration should apply to our public roads as is now in existence on our railroads. The system providing for a labor tax is abhorrent and distasteful to all free men. Let all the tax be collected in money. This amount may be largely reduced by working the county prisoners on the road to a much greater extent than is now done. In addition to this, our laws should be so amended as to send fewer convicts to the State penitentiary, the punishment for minor crimes being assignment to highway duty.

Arrangements should be made by which the State can turn over to each county desiring it as many convicts as she may have to spare. . . .

There should be an officer in every county called County Engineer, who should be selected, not on account of his ability to control votes, but who should be a practical man of some technical skill, and, above all, good common sense and judgment. He should have entire control of all gangs of laborers working in the county on public roads. He should be responsible to the County Court only and such unpaid commissioners as it may appoint from its own number. The foremen under him should report only to him. They should be constantly employed on the roads, engaged in permanent improvement most of the time and occasionally making flying trips over the various roads for running repairs.

. . . Whatever laws may be enacted and whatever plans adopted for the improvement of public roads, none of them will prove successful unless they have the support of the people, and above all is their success dependent upon the honesty, fidelity, skill and patriotism of the men who have in hand the execution of those laws. As long as our public offices are given as a reward of political services of the most questionable character, just so long may the public expect to have their taxes continually increased and their affairs badly managed.

*Extracts from a paper by Hunter McDonald, Chief Engineer, Nashville, Chattanooga & St. Louis, presented to the Tennessee Good Roads Convention.

American Locomotives in India.

Mr. J. N. Robb, Assistant Locomotive Superintendent, Bengal Central Railway, has written the following letter to the Agent and Chief Engineer of the road:

Five American engines were received and started to work in July and August, 1899. At the commencement of their career, the engines did not steam freely, and the fuel consumption was also very high—almost 70 lbs. per mile. This was, however, remedied by the introduction of the following alterations, viz.: (1) One single-exhaust pipe and blast nozzle (in place of double pipe and nozzle); (2) all deflecting plates removed from smoke-box; (3) new fire grate bearing bars to take 22 fire bars in place of 24; (4) new regulator valve of the State Railway type in place of single double-face valve; (5) india rubber feed pipes in place of brass castings ball and socket; (6) lubricators for pistons. Their performances at the present time are equal to the engines sent out by Dübs & Co. and Nasmyth, Wilson & Co. The fuel consumption has also been brought down to 40.5 lbs. per mile.

The cost of American compared with British engines is as follows:

	Cost.
Americans, steel fire-boxes, steel tubes, delivered in 75 days	£2,120
Americans, copper fire-boxes, brass tubes, delivered in 75 days	2,427
Neilson & Reid bogie, delivered in 12 months	3,060
Dübs & Co. bogie, delivered in 17 months	3,000
Sharp & Stewart bogie, delivered in 21 months	2,985

The fuel consumption is as low as that of the British engines, after being altered here by me. The American engines have run 118,440 miles since August, 1899, and no duplicates have yet been used, except the turning up of the bogie wheels of one of them. They are all, however, showing a tendency to have sharp flanges.

The engines pull well and run much easier than the British locomotives.

Since they were put to the lines, no repairs excepting the ordinary trifling ones were done. One has, however, been sent to the shops lately for somewhat heavy repairs, on account of its sustaining damage in a collision.

Since forwarding the above report of the American engines in November, 1900, these engines have been running heavier trains during the first half year of 1901, owing to the stoppage of all "goods trains." With these heavier loads, the American engines do not show so well in consumption of fuel as the English engines by nearly 3½ lbs. per mile. The consumption of oil is also heavier —almost 1 lb. per 100 miles run.

General Passenger Agents' Association.

The Forty-sixth Annual Convention of the American Association of General Passenger and Ticket Agents was briefly reported in the *Railroad Gazette*, Oct. 25, page 745. The official proceedings, which have now come to hand, give a few details not then touched upon. Secretary Smith, in reporting on the use of "Perfect Safety Paper" for joint tickets, strongly recommended that as soon as a date can be fixed for throwing away all joint tickets not printed on the safety paper, an agreement shall be made that from that date all lines shall decline to accept tickets unless they are printed on such paper. And as there is now only one important road, the Union Pacific, which has not decided to use the paper, it is hoped that by January, 1903, the desired uniformity can be brought about. Until the proposed rule to reject all other papers is adopted the value of the safety paper is largely nullified.

The report of the committee on the establishment of an insurance feature shows that this feature is to be established under a separate organization, to be called the Fraternal Society of the A. A. G. P. & T. A. The plan proposed does not contemplate regular life insurance; the idea is to pay $1,000 at death; and the assessment is to be $5; entrance fee, $10. All members are eligible. It is estimated that with assistant general passenger agents eligible the membership should be about 250. The Vice-President and Secretary of the A. A. G. P. & T. A. are to hold the same offices in the Fraternal Society, the secretary to be the treasurer also. Membership in the Fraternal Society is voluntary.

The subjects which were mentioned in the call for the meeting and which have not been touched upon in the reports of the proceedings were deferred until the next meeting.

Mr. John Francis, of the Burlington & Missouri River, who made the annual address, gave interesting facts in the history of the association, which is now 46 years old, and then took a look into the future. In this part of his address he said:

"While Utopian conditions may not prevail in passenger matters in 1955, it is fair to suppose that the lines represented in this association will not then do so many things they should not do, nor leave undone so many things they should do. Perhaps perfect safety paper will then afford perfect safety; non-transferable mileage will be non-transferable; tickets good only for continuous passage will not permit of stop-overs, and binding agreements will be equally binding upon all parties to them. The rules of division will be uniform and thoroughly established, the weak line securing as fair a share in the division as the powerful. The practice of enforcing rates will be as good as that of making them. There will be perfect uniformity in ticket forms.

"Advertising will be dignified and free from invidious comparisons. It will tend to create, rather than divert, travel. Because an advertisement may be paid for in mileage will then be no inducement to its acceptance. Advertising bills will be largely settled in cash, and the wife and children of the man that oils the wheels that run the press that prints the paper that publishes the interview that you built will buy tickets at regular rates when they travel on their summer vacation.

"The ticket scalper will be without a business. The courts will hold it as great a wrong to counterfeit a railroad ticket as a bank note, and the man who forges a name on a mileage book will be punished as severely as one who forges a name on a check."

Clearance of Side Bearings.

At the October meeting of the Rocky Mountain Railway Club, Mr. William Baird, General Car Inspector of the Burlington & Missouri River Railroad was called on to open a topical discussion on the matter of the proper clearance of side bearings. He spoke as follows:

I notice that not only our cars, but also a great many foreign cars, rest solid on the side-bearings. This is not good mechanics; the side-bearings are not put on the cars to rest upon, and when cars rest on the side-bearings solid, they must have a rigid wheel base. When the cars rest that way it is hard on the track. The greatest danger to the track is on rounding curves. The best way to have clearance on the side-bearings effective would be to oil the center plate. On our road we give the side-bearings a ⅜-in. clearance, and we have little trouble. I think the members of this club should pay more attention to the clearance on the side-bearings of cars when passing through the shops, and see that the bolsters are being made rigid enough so as to prevent any trouble. On passenger cars it is all the more necessary that we have a clearance on account of the length of the cars.

W. J. Schlacks.—We had a lot of trouble with stock cars on our road and they were continually going off the track. I believe it was 32 that went off the track in about six months; maybe a few more. After investigation, we found that it was on account of the friction caused by a steel bolster coming in contact with malleable lower center plates and side-bearings. These were changed and we have had no trouble since then. On account of such things, it seems to me that perhaps a discussion on the center-plate would form a good topic.

The Westinghouse High Speed Brake.

In the *Railroad Gazette* of Oct. 21, page 736, will be found extracts from a paper by Mr. F. M. Nellis on the air-brake which was read recently before the New York Railroad Club. Below are further extracts devoted particularly to the high speed attachments.

To railroads which are on the alert to obtain the most highly efficient brakes and the consequent ability to stop trains in the shortest possible distance, the high speed brake cannot but recommend itself very highly. This brake has been especially designed to meet the exceptional requirements of modern fast running trains, where speed may be quickly and efficiently reduced to make the shortest possible stop and to meet emergencies. The high speed brake will bring trains to an emergency stop in 30 per cent. less distance than the best brakes of the ordinary quick action type, and this is accomplished by the simple addition of a few parts to the standard air-brake devices already on the locomotive and cars and which converts the ordinary brakes into high speed brakes (as illustrated by the heavy black lines in the engraving) and by increasing the train line pressure from the ordinary standard of 70 lbs. to the 110 lbs. high speed train line pressure.

For modern high speed trains much better brakes are necessary than when 40 or 50 miles an hour were considered high speeds. At a speed of 60 miles per hour about five times more braking power is required to stop the train than at 30 miles per hour, and more than two and a half times than if the train were running at 40 miles per hour. At 70 miles per hour about five times as much braking power would be required to stop the train in the same distance it would be at 35 miles per hour.

High speed trains are usually given the right of way through yards and over railroad crossings, denied to ordinary passenger trains, which are obliged to slow up. Should these fast running trains be required to move under control through yards and over railroad crossings, as they are supposed to do, and as ordinary trains are compelled to do, even excessive high speeds between stations would not permit the high speed train to make its time and reach its terminals on scheduled time. Therefore all opportunities to take advantage of circumstances must be employed by the engineer, and it is frequently a permissible disobedience for him to take some of these advantages through yards and at railroad crossings as above mentioned. This, however, is done at unwarranted and great risk.

Less than two months ago one of the fast running trains, extensively advertised, collided with an excursion train on a crossing where the portion of the excursion train struck was demolished and the collided engine was ditched. Upon investigation this highly advertised high speed train proved to be equipped with the ordinary automatic brake on the locomotive and all of the cars—not a single high speed brake being in the train. The investigation of the accident brought out the statement that the engineer, while running at a speed of about 65 miles per hour, shut off steam and called for the semaphore signal almost a mile from the railroad crossing. Being accustomed to getting the signal, though sometimes tardily, he allowed the train to drift without being checked by the brakes for some little distance before he made the second call for the semaphore. Upon being denied passage at this second call he applied the emergency brake and was horrified to see the belated excursion train pulling over the crossing where he had been usually allowed the liberty of crossing at a speed of about 30 miles per hour. The cost of this accident, which has not yet been settled and distributed, will doubtless prove more in damages, etc., than it would take to equip every locomotive and passenger equipment car on that road with high speed brakes.

The principle of the high-speed brake is simple and effective. It gives an abnormally high braking pressure when applied in emergencies at high speeds and gradually reduces the pressure on the brake shoes as the speed of the train reduces, thereby applying the greatest retarding force when the speed of the train is high and there is less danger of sliding the wheels, and gradually reducing it as the speed reduces, and the danger of wheel sliding is thereby reduced to a minimum. At the moment of emergency application the high speed brake throws 40 per cent. more pressure on the brake shoes than is ordinarily had in emergencies with the ordinary quick action brake. In addition to the advantages derived from the quick action brake in venting its increased train pipe pressure to the brake cylinder and mechanically reducing it in emergencies as the speed comes down, it offers exceptional advantages in ordinary service stopping, inasmuch that the automatic reducing valve, being regulated at 60 lbs. pressure, will permit all pressures above the safety limit to escape to the atmosphere very rapidly. It also holds sufficient pressure to make two or three ordinary service stops without it being necessary to recharge the auxiliary reservoirs. Thus an engineer always has in reserve enough pressure, even after making two or three service applications, to obtain an emergency application of the brakes equal to that given by the ordinary quick action type.

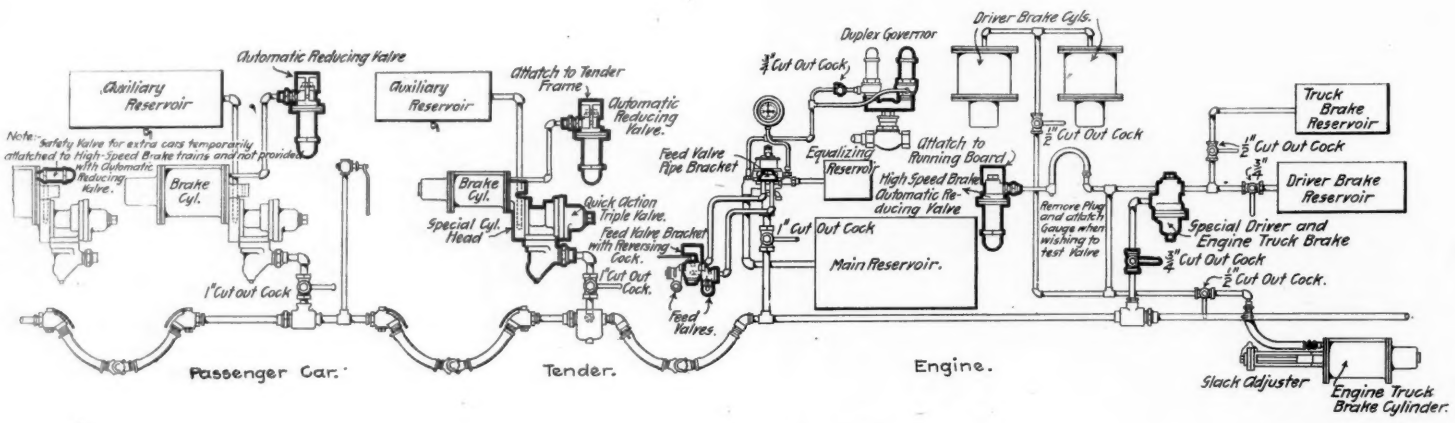


Diagram to Show the High Speed Brake Attachments.

The Special Parts are Shown in Heavy Lines.

The high speed brake has been in successful operation now nearly six years on the fast trains of such roads as the New York Central, Pennsylvania, New Haven, Lehigh Valley, Lake Shore, and other roads also in the West and South, giving most satisfactory performance with practically no complaint whatever.

The high pressure control apparatus is a similar though modified arrangement, typical of the high speed brake, and is adapted to freight train service on mountain grades where empties are hauled up the grades and loads are dropped down, thus requiring a high brake power while coming down and a lower braking force in ascending the grade. By the mere turning of a cock the change from low pressure to high pressure, or vice versa, is quickly and unerringly made. The high pressure control apparatus is being used on a great many of the Western mountain grades and in other ore and coal districts where this peculiar condition of traffic exists. It it also being quite extensively used by some Eastern lines that are working up their air-brake service.

Repairs to Air-Brake Apparatus.—The old practice of making running or roundhouse repairs of air-brakes on locomotives is rapidly giving way to a new and better practice of taking the parts to be repaired off the engine to the machine shop, where better facilities and proper time may be had. Repaired parts are held ready to be placed on a locomotive requiring such repairs, the "first in first out" practice being followed. The Lehigh Valley adopted this system of repairs some little time ago and reports excellent results from its working. This road also goes further and makes a practice of taking each air pump, brake valve, governor, air gage, etc., off the engine once in six months, placing it on a test rack in the shop, where it is tested and inspected for necessary repairs. Should any work be necessary it is done at once instead of waiting until a certain part gets so bad as to give a violent notice, while in service out on the road, by a partial or whole failure of its function.

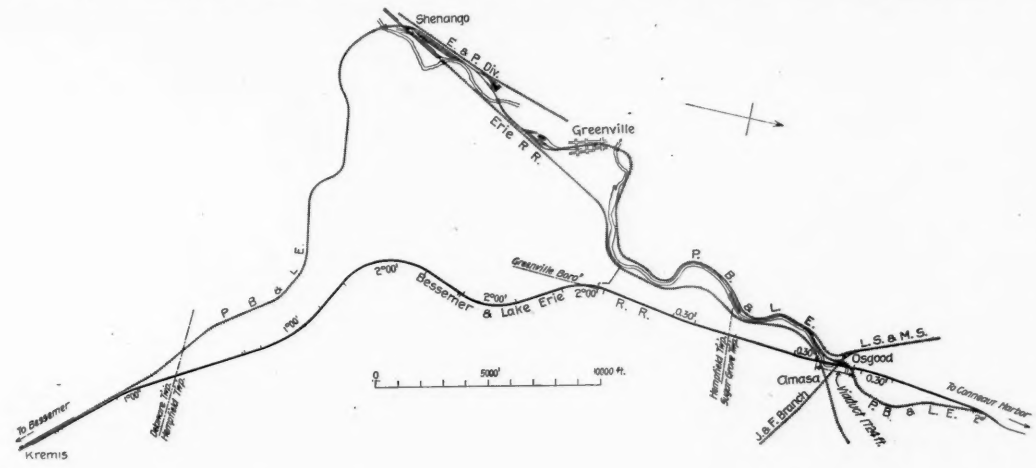
A large number of railroads have adopted the practice of shipping to the manufacturer their worn triple valves for repairs when the packing ring has become worn. The railroads which have adopted this practice praise it

highly and confess that the work is done cheaper and better than they could do it in their own shops without installing the necessary refined apparatus and employing skilled mechanical specialists. One of the first roads to adopt this method was the Nashville, Chattanooga & St. Louis, which sends its triples in lots of 25 to 100 as soon as they are removed, getting back promptly a like number of triples from the works without loss of time. At the last M. C. B. convention in Saratoga a prominent Southern Superintendent of Motive Power paid a high compliment to the N., C. & St. L. road by saying that their trains were "undoubtedly the best maintained air-brake trains in the South, and, for that matter, anywhere else."

Bessemer & Lake Erie Cut-Off Near Greenville.

The engravings show a plan and profile of the work that is doing on the Bessemer & Lake Erie Railroad from Kremis northward to a point a little beyond Osgood. The contract for grading and masonry for seven miles of this work between Kremis and the Erie Railroad was let last spring to the Brodhead Contracting Company. The foundations for the viaduct and the grading and masonry north of the viaduct is being constructed by the railroad company. The steel work for the viaduct was let to the American Bridge Company. It is the intention to begin operating the line April 1, 1902.

The engravings show very well the character of the work, the old line being shown cross-hatched and the new line plain. The main purpose in building this new line (it is a little over nine miles long) is to eliminate



Plan and Profile of Old and New Line—Bessemer & Lake Erie R. R.

NOTE.—*Old line cross-hatched; new line plain.*

some heavy grades against the southbound loads. The improvement will, however, give that much second track as the old line will be kept in use for northbound freight trains and for all of the passenger trains and local freight. It will be observed that the grade southbound is reduced from 1¼ per cent. to $^{6}/_{10}$ of 1 per cent., and also that a good deal of curvature is taken out, the sharpest curve on the new line being 2 deg., and that the new line will be $2^{8}/_{10}$ miles shorter than the old line. The viaduct at Osgood carries the new line over the present line, the J. & F. branch of the Lake Shore & Michigan Southern, and the main line of the Erie. Naturally the new line involves considerable heavy work, the deepest cut which we find on the profile being 30 ft. For the blue prints and other information concerning this work we are indebted to Mr. E. H. Utley, General Manager, and Mr. H. T. Porter, Chief Engineer.

The Isthmian Canal.

Discussions of the Isthmian Canal matter long ago ceased to be amusing, but Mr. S. D. Webster (General Claim Agent, Terminal Railroad Association of St. Louis) has contrived to state some important facts in a lively way. His statement was before the St. Louis Railway Club, Oct. 11. We cannot very well print the full text of his paper, but characteristic extracts follow:

In the *Official Proceedings* for July, page 15, will be found my text in the shape of a paper on the Nicaraguan Canal project. If there is anything under the broad canopy of heaven to distract a railroad man from the consideration of, let us say, the sins of other people, it is a canal project; so attention is at once attracted to the article. We read with increasing wonder the alleged facts, we are astounded at the figures, and at last are lost in the stupendousness of—well, in the stu-something; in fact, we are left in the stew. I don't know how better to express it. Let me quote:

"It has been estimated that the probable cost would be between one hundred and one hundred and twenty millions of dollars—a mere bagatelle when you consider the estimated savings in cost of transportation will be four hundred and twenty millions of dollars annually, so that the original cost, plus maintenance, are insignificant, and should never be allowed to enter into the question at all." . . . Gentlemen, if we can make a net saving of 420 millions per annum on an investment of 120 millions we mustn't let the chance get away from us. Let us get some salt on the tail of this financial bird. . . .

To be sure the fourteenth annual report of the Interstate Commerce Commission gives the total earnings of all the railroads in the United States as $1,313,610,118. This savings of our text would, therefore, equal almost one-third of the entire revenues of all the railroads of the country from all sources. The same report gives the cost of operation of the same railroads as $856,969,000, and our saving, according to the text, would be about half the amount paid by all the railroads for their entire operation and maintenance. Think of what this involves! Why, gentlemen, the man who sold articles for less than they cost, but was able to do it because he sold so many wasn't "in it" with the financial scheme involved in this canal. . . .

The "wedding of the waters" sentiment suffers sadly when it has to be effected through 186 miles of tortuous canal and lake, and through locks, for there is a total difference to be overcome in canal and sea level of 220 ft. vertically.

The war vessel part would seem to be important, measured by the voyage of the Oregon. But all we need consider is that the canal would have to be our own absolutely, or it would have to be neutral in time of war. Even if it were our own, a few heroic souls, willing to let posterity remember them for devotion to their country, be it what it might, could sink a Merrimac in the scant channel and block it absolutely.

The rate would next have attention. Just bear in mind that there is only one canal that hasn't rail competition—at least only one that occurs to mind at the moment, the Suez Canal. Every other canal, certainly all those in this country, have their rates made by the railroads. Not in competition with the canal, either, but in competition with other railroads. The Isthmian Canal would have the competition of 13 transcontinental railroads; the Suez Canal has no competitors. Its rates are limited only by "what the traffic will bear." It gets $2 per passenger, and (I have read) $1.55 per ton. This relates to what the canal toll, on which the owners would derive revenue, should be, a matter entirely distinct from the through freight rate at and upon which the carrier would compete with the railroads. Apart from the fact that rates made by vessel owners are largely contingent upon return lading, at any given charter party rate for a vessel, the saving in time by the shorter canal, as against the longer open sea route, would have to be more than sufficient to balance the charge of the canal. For example, a vessel of 3,000 tons register, chartered at $200 per day, would have to save 30 days by the use of the canal, or it would take the longer route, in preference to paying, approximately $6,000 for the use of the canal, pilotage, possibly towage, etc. These points can only be touched upon in passing, and it would seem that we may leave out of consideration the competitive feature, so far as reducing rail rates is concerned.

As to amount of traffic, the most ardent promoters offer figures up to 8,000,000 tons per annum; those less sanguine or more thoughtful, don't reach quite so high, and some cannot see more than 4,000,000 tons under very favorable conditions. I may suggest that it is improbable that any of the very high-priced products will be diverted from present rail routes, so that the canal will have to depend upon low-priced traffic, which must have low rates, and it will be well to bear this in mind. Those who have given the matter careful consideration offer reasons to sustain their contention that the available traffic may not exceed 300,000 tons per annum. Mr. Nimmo, after a most careful presentation of the matter, says "that it is doubtful if 500,000 tons could be exceeded on this canal." . . .

Years ago, Lieut. Maury wrote: "Should nature, by one of her convulsions, rend the American continent in twain, and make a channel across the Isthmus of Panama or Darien, as deep, as wide, and as free as the Straits of Dover, it would never become a channel for sailing vessels, saving the outward bound or those which could reach it with leading winds." The reason for this is simple, but most effective, as many simple things are in nature. Both sides of the Isthmus are in the region of calms, commonly known as the "doldrums." This is true also of the Suez Canal, and restricts its traffic almost entirely to steam vessels or such as have to use it as a route. As now, sailing vessels would have to go via the Capes, and the "commerce of the world," flowing through our canal would have to be limited to steam commerce.

Distance cuts a large figure in the flow of commerce. A few items will illustrate: It is shown by comparison that the distance via Suez and via the proposed Isthmian Canals from Liverpool to, say Calcutta, Hong Kong, Yokohama, and Melbourne, is in favor of the Suez route by from 872 to 934 miles. From New York to Calcutta, via Suez, is nearly 5,000 miles the shorter. To Hong Kong, however, the Suez is the longer by some 500 miles, but on this traffic some other conditions intervene, and apply to much of the Pacific ocean business. Coal has to be obtained en route or carried if coaling facilities are not obtainable. Lack of these in the Pacific will almost preclude the use of the Isthmus route. There are other reasons for limiting the traffic to the small tonnage given by Mr. Nimmo and other careful statisticians, and they warrant the assertion that the expression "commerce of the globe," when used in this connection, is the veriest humbuggery.

It occurs to me to add, right here, that if railroad traffic could be diverted to water routes, our Pacific coast cities would suffer at once, as vessels wouldn't run out of their course merely to make stops that offered no financial returns. Also, that the Suez Canal was built by private capital; that it was opened in 1869, the year our first transcontinental road was opened, and that we have now six. If the opening of the first compelled (as it did) the abandonment of the Isthmian Canal scheme as a commercial enterprise, what financier would risk anything with six? . . .

In the number of curves and larger radii, in the matter of rainfall, and consequent fluctuation of the lake level, or cubic feet of water discharged, of winds or storms, the advantage seems to be found with Panama; indeed, all the argument is in favor of Panama, but the conclusions approve of the Nicaragua route because its government is free to grant concessions.

This report places the cost of a Panama route at $142,000,000, and of Nicaragua at something over $200,000,000, at standard dimensions of depth of 35 ft., and width on the bottom, where sections are straight, of 150 ft., increasing to 300 ft. in width as the curves decrease in radius on the curved sections. This, they state, would "permit all but the very largest ships to pass," but if the largest meet, one will have to "take the bank while the other goes by." It is open to a suspicion that it will come pretty near "taking a bank" to get a large ship through the canal at all. Observation of the estimates of cost prepared and submitted by Government Commissions, compared with the actual amounts ultimately paid for construction covered by those estimates, would indicate to us that $300,000,000 might be nearer what such a canal will cost. The figures of one writer, whose experience warrants credence, place his estimate at not less than $250,000,000.

From the report it appears that 50 years ago there was a good harbor at Greytown, the eastern terminus of the canal, with 30 ft. of water at the anchorage and about the same depth in the entrance. The entrance to this harbor, where it then existed, has been obliterated, and the harbor itself is now a lagoon, almost entirely closed, of restricted area, with only about half the depth of water in it that formerly existed. And we are told that it will be necessary to construct a costly harbor, whose "maintenance will require an extension of the jetties or dredging, or both." . . . The most difficult engineering work in connection with the project is the construction of a dam across the San Juan River. . . .

It is a serious question whether such a dam could be properly constructed. One may say that with money anything is possible. Well, perhaps. M. Bunau-Varilla says that Nicaragua has always been the site of seismic convulsions. Scarcely a month passes without one or more being noticed. The center of these disturbances is always near the line of the Nicaragua volcanoes. "The explosion of the volcano Coseguina, in 1835, lasted 44 hours, the noise was heard at a distance of 1,000 miles, the ashes were brought 1,400 sea miles by the winds, the mass ejected into the air was calculated to have covered a surface equivalent to eight times the surface of France, and the volume was calculated to be equal to 50 cubes, having sides of 1,100 yards, which allows me to say that during these 44 hours the volcano ejected every six minutes a volume of stone and ashes equal to the total volume of the prism of the Nicaragua Canal.

There are no engineering difficulties in the way. Let us turn over in our minds the possibility of maintaining intact if, it could ever be completed, a dam 150 ft. high, in the event that, after the usual series of slight earthquakes every month, there should come a repetition of that cataclysm, and then see whether we can stand it any better than the dam could. There is an active vol-

cano, in the very center of Lake Nicaragua, whose last great eruption was as late as 1883, and a half dozen are noted, one of them having been born as recently as 1853.

It all reminds me of the experience of some folks I know. They went to Kern County, in California, and got some land. It would be all right if they could get water, and they set about it. They were two young men, and they found no engineering difficulties in the way. There was water enough in the river; it was only four miles away; and they plowed and they scraped, until they had a ditch 4 ft. to 6 ft. wide, 3 ft. or 4 ft. deep, as the conformation of the country demanded, and success seemed assured. To be sure, they were about "busted," but all they had yet to do was to turn the water on and fill their ditch. That night a sand storm set in. At the end of three days their canal was of uniform contour with the country through which it had been dug, and not a single engineering difficulty stood in the way of digging it all out again. Indeed, digging sand was easier than the earlier construction had been. It would have been amusing if it had not been pathetic. Lest you feel that possibly honest effort failed of its reward, I will add that the youths set to work again, got all the credit they could, the old mother giving up even her treasured watch, they got out the sand, they got water to their lands, they got alfalfa enough started to show that crops could be raised and they unloaded it all on a promoter.

Comparisons are odious, and figures tiresome, but I must beg your indulgence a few moments longer to the commercial aspect presented . . . . What the conditions will be at Nicaragua have been suggested in this paper; what the cost to maintain the integrity of the canal can only be guessed at. Mr. Nimmo thinks it would be at least as much as at Suez. Col. A. F. Walker says that it is safe to estimate it at $2,000,000 per annum and that it may cost four times that amount. Mr. Collis P. Huntington's estimate was $5,000,000, and let us take this for our comparisons and see where it lands us.

	On the Friendly Basis.	On the Critical Basis.
Cost of canal, etc.	$140,000,000	$250,000,000
Interest charge at 4 per cent.	5,600,000	10,000,000
Mainten. and operation, etc.	5,000,000	5,000,000
Amount to meet annual outlay.	$10,600.000	$15,000,000
Tonnage to be locked.	4,000,000	300,000
At Suez rate of $1.55 per ton.	$6,200,000	$465,000
Deficit	*$4,400,000	†$14,535,000

*Under the most favorable conditions. †Under the least favorable conditions.

Basing the charge per ton on these estimated tonnages and there would have to be collected respectively, on

4,000,000	tons at	$2.65 to get	$10,600,000
4,000,000	" "	3.75 " "	15,000,000
300,000	" "	35.00 " "	10,500,000
300,000	" "	50.00 " "	15,000,000

From a commercial standpoint, as a business venture, no one with fairly good sense would look at this scheme a second time. As a movement on the part of the government, all may manifest an interest or an indifference as they are interested or indifferent to matters of government generally.

As a political scheme, with the object of creating as our own, and under our own absolute control, by treaty if possible; regardless of treaty should need require; a route for our vessels of war in case of possible war, the cost of a canal, and of its maintenance, is but a fraction of what will have to be expended. Where a coal barge, sunk at a suitable point, will render it absolutely useless, we would have to secure it to ourselves by a Gibraltar at each end, at a cost of, say, $200,000,000 each, for construction, besides the annual maintenance charge. The simplest computation would suggest that it would be far cheaper to double, or even treble, our naval armament, and maintain it on either coast for any possible contingencies. . . .

Flanges or Blind Tires.

At the October meeting of the Rocky Mountain Railway Club the question of blind tires again came up. In the course of the discussion the following letter from F. W. Johnstone, recently Superintendent of Motive Power and Machinery, Mexican Central, was read:

"We are running consolidation engines on our mountain grade of 3 per cent., with 24-deg. curves and 75-lb. rails; guard rails on all curves exceeding 17 deg. These locomotives have all the drivers flanged; 15-ft. driving wheel base, 23 ft. 5 in. total wheel base of engines, 160,000 lbs. on the drivers. These engines pass the curves freely, and the flange wear on the front drivers is very much reduced, as the second pair of drivers takes a part of it. Before we commenced to flange all of the drivers we had trouble with the blind drivers getting off the track, when the engines slipped violently in climbing grades. Although these blind drivers were 6½ in. wide, when the engine began to slip she would crowd herself sideways until the blind drivers got off the track. With all of the drivers flanged this cannot occur. And for the past two years we have flanged everything on the road—consolidation engines, 10-wheelers and moguls. To assist these consolidations in curving easily we allow a lateral play between inside of the hub and driving boxes, as follows:

Front pair of drivers, ⅛ in. on each side.
Second pair of drivers, 1/16 in. on each side.
Third pair of drivers, 1/16 in. on each side.
Fourth or rear pair of drivers, ¼ in. on each side.

The side rod brasses have lateral play on the pins as follows:

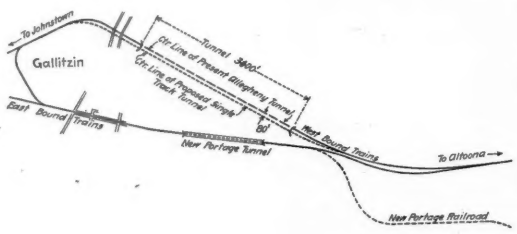
Front pin, 1/16 in.
Second and third pins, 1/32 in.
Fourth or back pin, ⅛ in.

These engines haul 250 gross tons back of the engine up these 3 per cent. grades and around these curves varying from 15 deg. to 24 deg., with only one tangent in 30 miles, which is as long as an eight-car train; and we get about 30,000 miles out of these engines between the turning of tires. In fact, the flanges do not get sharp any sooner than the tread of the tire wears down to our limit of ¼ in. in depth."

Mr. Hardy.—We have five engines in service on our road and they weigh 158,000 lbs. on their drivers, and have a 15-ft. 9-in. rigid wheel base. These engines run around 16-deg. curves every day, and we have no derailments to speak of on the main line, and when we do it is pretty generally the fault of the track. We have found that the engines damage the track in no way, and on one of the engines 1/16-in. flange wear is the greatest damage we have been able to discover. In fact, they are very easy on the track. The front flanges are the ones that show the greatest wear. They are very nice riding engines, and there is no complaint about the way they round curves, and there is very little oscillation.

A New Tunnel at Gallitzin.

The Pennsylvania Railroad Company is advertising for bids on a new tunnel to be built through the Allegheny Mountains at Gallitzin. This is to be 3,600 ft. long, parallel with the existing tunnel (of the same length) and 80 ft. south of it. The contract will also include 1,200 ft. of approach at the west end. This new single-track tunnel is designed for westbound trains, thus relieving the existing tunnel. The diagram of the relative position of the track now, and as proposed, appears herewith. The bids will be opened Monday, Nov. 25, and plans and specifications may be seen at the office of the Chief Engineer, Mr. William H. Brown, at Philadelphia; also in the office of the Assistant Engineer, Mr. John F. Murphy, at Summer Hill, Pa.



No doubt a good many of our readers have seen, in the newspapers, a story about the project to build a tunnel seven miles long through the Alleghenies to get rid of the Horse Shoe curve and grade. Within a day or two, in fact, an article has reached us from San Francisco describing this new tunnel and also comparing it with existing long tunnels. The story was so improbable on its face that we never asked any of the Pennsylvania officers about it; but we notice that it has been denied by Mr. Brown in a newspaper interview. The origin of this newspaper tunnel is now disclosed. Doubtless some correspondent at Altoona heard of the new westbound tunnel to be built at Gallitzin, which grew in his imagination to the great tunnel which should get rid of the Horse Shoe curve.

The Supply of Timber for Ties.

In the discussion of the reports on the preservation of timber, presented at the Paris meeting of the International Railroad Congress, Mr. Herzenstein, one of the reporters, made the following remarks about the supply and consumption of timber:

The railroads of the whole world are about 750,000 kilometers (466,000 miles) in length. In calculating what is required for building a kilometer of line (allowing 1,500 sleepers for a kilometer of main line), I find that one must fell a hectare (2.47 acres) of forest, holding from 200 to 250 trees of large enough diameter to get at least seven sleepers out of each; the 750,000 kilometers of railroad have then necessitated the felling of 750,000 hectares (1,853,000 acres) of forest.

As a rule, it takes between 70 and 90 years for the forests from which sleepers are taken (oak, pine, spruce, larch) to grow up and only 5 per cent. of the trees felled shoot out again. If we count that on the average a sleeper may last seven or eight years (observe that in some countries their life is only two years), 100,000 hectares (247,000 acres) of forest have to be felled annually for renewal purposes. Seeing that the world's railroads increase about 10 per cent. annually, to meet the requirements of this increase necessitates the felling of a further 75,000 hectares (185,000 acres), or altogether 175,000 hectares (432,000 acres). When we remember that on the most favorable estimate only 5 per cent. of the trees felled grow up again, you will realize, gentlemen, that the position is very serious. Many countries, in view of so large a consumption of timber, foresee a shortage which must be met by taking special measures. Let us see in what way these can be taken.

As I have stated in my printed report, the first thing to do is to find out a method to preserve sleepers from the mechanical wear caused by traffic and by chemical action, that is to say rot, so as to insure their lasting at least as long as it takes for the kind of tree from which the sleepers are cut to grow again. Secondly, we must discover a kind of wood that grows again rapidly, and perhaps even investigate the conditions under which such reproduction can be markedly accelerated. According to the data given in my report, a properly prepared sleeper (of oak, beech, pine or larch) lasts on the average 30 or 32 years; it may even last 40 years, as has been shown on English lines. In France, sleepers of oak and beech last from 30 to 35 years; the engineers of the Eastern Railroad informed me that, on the Alsace and Lorraine railroads, the German management, when lately examining the sleepers laid before the war of 1870, found them still in good condition.

Now there are some kinds of trees that grow large enough in 30 or 35 years, such as beech, asp, birch. These kinds are also suitable for sleepers; other kinds perhaps only need a change in some of the conditions under which they are usually cultivated to quicken their growth. By adopting a few modern methods of preservation, sleepers of all these kinds can be made to last for 40 years and much longer, not only in sidings but also on main lines.

The Causes of Break-in-Twos.

We are getting nowadays from the Nashville, Chattanooga & St. Louis a good deal of statistical information which can, after a while, be grouped and generalized into some valuable conclusions. As the reader is well aware that company does the best work in watching and repairing its freight car air-brakes that is done in this country. Below is a little table which the General Manager has sent us of the causes of train parting for the year including July, 1901. His original table gives the figures month by month, but the totals will doubtless serve the purpose of the student of this question quite as well as the monthly reports.

Train Parted Report, Year Ending July, 1901.

Draft timbers pulled out	87
Draw-bar broke in shank	96
" " top knuckle lug	56
" " through head	21
" " bottom knuckle lug	3
Knuckle broke	189
" opened	73
" pin broke	7
" lock pin broke	12
M. C. B. couplers parted	77
Key broke, continuous draw-bar	59
Slip pin key broke	20
" " key lost	23
" " broke	78
" " head pulled through end draw-bar	6
Yoke strap gave way	5
" bolts broke	3
Link broke	2
Total	817

Baggage Handling at the Quai d'Orsay, Paris.

In the July issue of the *Revue Générale des Chemins de fer* there is a very complete description of the method used in handling baggage at the Quai d'Orsay station of the Orleans Railroad in Paris. A feature of the station is its division into two floors. The large waiting room, on the ground floor, extends out to the level of the streets. The tracks and platforms below ground cover the area enclosed by the foundations and extend beneath the streets and adjacent buildings.

The rail is 19 ft. 8 in. below the ground floor. The platforms are of the usual elevated type and baggage is lowered 16 ft. 11 in. from floor to floor. There is an elaborate system of baggage handling from floor to floor. It is operated upon three systems of electric elevators, of which there are 17; inclined chutes, used only for lowering, of which there are 10; and by an endless belt that may be either horizontal or inclined and arranged to carry baggage delivered from arriving trains to the main platform. On the ground floor there are also conveyors for separating and classifying baggage for delivery.

When there is a rush outgoing baggage is divided between two groups of weighing scales. The traveler receives a provisional check, which he later exchanges for a definite check upon which he pays the charges. Each of the two groups has facilities for sending baggage to the five public and two supplementary platforms. Thus all baggage for main line trains passes from the porch directly to the platforms of the lower floor without going through that portion of the out-going waiting room that is open to the public. Only the suburban baggage crosses this room for a short distance at a point inaccessible to the public.

Incoming baggage is delivered from special benches in the vestibule of the ground floor. The three platforms used for incoming trains have electric elevators to the baggage room.

This installation easily handles the suburban baggage, but the main line service, which, at certain hours, is very heavy, requires a system having much greater capacity. The incoming platforms of the main line trains have horizontal and inclined belt conveyors which receive baggage from many points along the platform and carry it to the center of the distributing room. There it is delivered to a traveling platform, by which it is carried to the delivery counter. The electric elevators have a capacity of 2,200 lbs. each, and can be run at speeds of one meter or one-half meter per second, according to their load.

The contour of the chutes varies from a straight line to a helix, the latter being the contour of the chute by

which outgoing baggage is sent from the ground floor. The average grade should be about 40 per cent., but it should be a little steeper at the start and on sharp curves. The chutes end in a horizontal section connected to the inclined part by a curve intended to gradually check the motion of the trunk. This horizontal section should be about 7 ft. long, but may be made much shorter. Special arrangements are made for chutes with very steep grades and sharp curves. At the foot of the incline a piece of brush cloth from 3 to 5 ft. long is placed. An incline of 40 per cent. is sufficient for iron-bound or polished wood trunks, but it is not enough for canvas valises, sacks, bundles of clothes and boxes of rough wood. With the strip of rough cloth arranged as described an average inclination of 60 per cent. can be used, and the descent of any piece of baggage made certain. Even those that move fastest will be stopped on the cloth. When the chute is not in service the lower end is raised on a hinge connection so as to leave a clear space of about 7 ft. above the platform.

Belt conveyors are used for handling baggage, single pieces of which may weigh 225 lbs. or more. Fig. 1 shows a longitudinal section of one of these conveyors used to raise baggage from the track platform to the ground floor. Diagrams therewith show baggage

Fig. 2.

Fig. 3.

easily open and fasten them in position upon the arrival of the train. On the ground floor the baggage comes down through the chutes C^6, C^7, C^8 and C^9.

The inclination of conveyor A^1 is about 47 per cent. and that of B is about 50 per cent. The speed of the conveyors is one meter (3.28 ft.) per second. The length of A, A^1 and B is 443 ft., 177 ft. and 177 ft. respectively. The dynamo D, Fig. 1, drives A^1 alone by belt, or both A and A^1 by a clutch. The energy absorbed is almost entirely independent of the number and weight of the trunks being moved, and ranges from 15 k.w., when starting, down to 8, when in motion, for A alone, and from 20 to 12 k.w. when the two conveyors are run at once. The conveyor B is run by the dynamo D^1 with an endless screw.

Each conveyor has an endless belt of manila hemp,

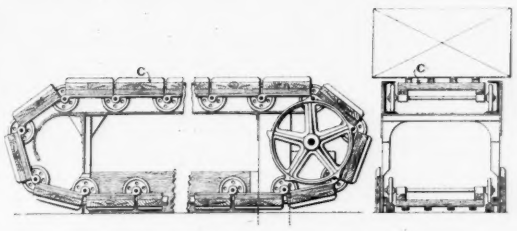


Fig. 4.

at the center. The carrying rollers are cylindrical shells riveted to cast-iron spiders at the ends. On the carrying side these rollers are spaced 1 meter from center to center, and on the slack or return side the distance is 3 meters (9.84 ft.). The idlers are entirely of cast-iron. To insure easy passage of the baggage from the chutes to the belt conveyor, and vice versa, care should be taken that the chutes, which receive the packages from the conveyor, are set from 2½ in. to 3 in. below the projected line of the belt as shown in Fig. 2. Chutes delivering packages to the conveyor must not have a horizontal section connected by a curve to the inclined portion. The descent of the package to the conveyor must be assured. Fig. 3 illustrates this, showing the connection between conveyors A and A^1, which is effected by using a 50 per cent. incline.

The traveling tables by which the baggage is distributed on the ground floor are formed of strips of oak, C, Fig. 4, bolted to frames and carried on wheels like the ordinary treadmill. It may thus be seen that there is really a duplicate system for handling both the incoming and outgoing baggage, so that in case of the failure of any part of the electrical apparatus the other can be brought into service.

The service rendered by these conveyors is enormous. It takes care of the baggage with far greater rapidity than it can be unloaded from the baggage van. The time required is merely dependent upon that needed to pass the baggage from the van to the platform. This

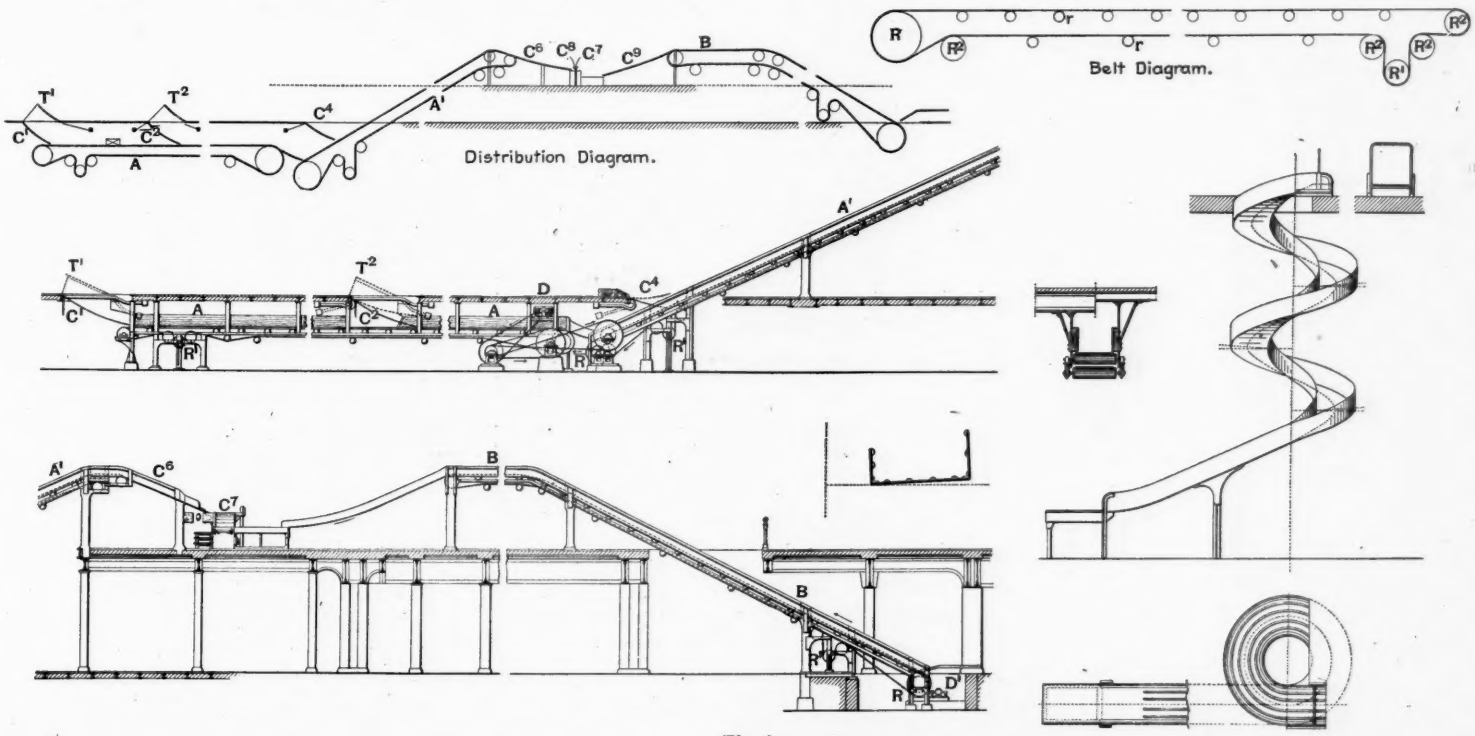
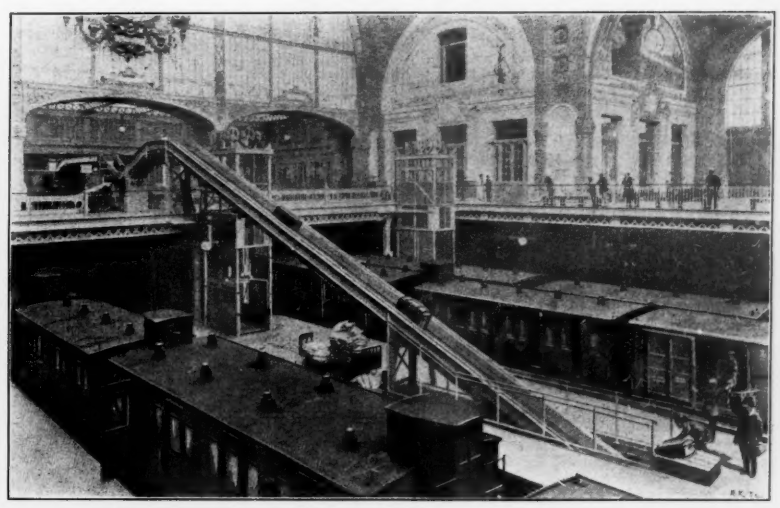


Fig. 1.



Baggage Handling at the Quai d'Orsay Station—Orleans Railroad, Paris.

distribution and the outline and accessories of a conveyor belt.

Baggage vans entering at the head of the train are served by the conveyor, which is entirely above the floor and rising. Vans at the center or rear of the train are served by the system of conveyors to the right marked A A^1, of which A is a short horizontal one and A^1 a rising one. Baggage may be put upon the conveyor A through the trap T^1 and the fixed chute C^1, or through the intermediate trap T^2 and the movable chute C^2. It may be put upon the conveyor A^1 by the movable chute C^4. The movable chutes C^2 and C^4 are balanced and can rise under contact with trunks from beneath. The traps T^1 and T^2 are also balanced so that the porter can carried on the driving roller R; the compensating roller R^1; the carrying rolls *r* and the idlers R^2. Forty-five ¾-in. ropes are sewed together, the breadth of the belt being 90 centimeters (35 in.). A belt weighs about 31½ lbs. to the yard. In the six months that they have been in service at the Quai d'Orsay there has been no appreciable variation in their length. Sprinkling lightly with water tightens the belt very noticeably and increases the amount of work absorbed in driving it, but this latter effect is very brief. In less than half an hour the consumption of energy returns to the normal. The increased adhesion prevents slipping of baggage even on grades of 50 per cent., and is needed only once a day.

The driving pulley is a wooden drum slightly crowned

conveyor does require, however, a large number of men, so that it is only applicable in large stations. The trunks that can be carried must not measure more than 31½ in. square with any third dimension. Larger or higher packages, or those containing breakable materials are carried on the elevators.

The article concludes with the statement that while a high efficiency is rendered by the elevators, it was thought prudent to supplement them with the chutes; and that in the case of incoming baggage, in spite of the superiority of the conveyors it has been found to be impossible to avoid the use of the elevators for certain classes of baggage. The elevators are also used for passenger service.

Train Accidents in the United States in September.*

xc, 1st, Pennsylvania road, Connellsville, Pa., freight train with an engine at the rear, as well as one at the front, broke in two, and the two portions were stopped or controlled within a minute or two; but by a mistake in signaling the rear portion was pushed against the forward portion, wrecking eight cars of coke. The brakeman who gave the wrong signal was killed.

unx, 1st, Queen & Crescent, Poplarville, Miss., a mixed train was derailed and a tramp stealing a ride was killed.

bc, 2nd, Erie road, Doughton, Ohio, butting collision of freight trains, wrecking 12 cars; three trainmen injured, one fatally. A mistake in orders is said to have been the cause of the collision.

rc, 2nd, Pennsylvania road, Spring City, Pa., a freight train which had been unexpectedly stopped was run into at the rear by a passenger train, damaging the engine, caboose and several cars. The wreck took fire and was partly destroyed. Some of the cars contained dynamite and other explosive or inflammable freight and a number of explosions occurred. A bridge on which the freight was standing was damaged. Six trainmen were injured.

xc, 2nd, Vicksburg, Shreveport & Pacific, Whiting, La., collision of passenger trains at the side-track where they should have passed one another; one passenger car wrecked and overturned, two passengers injured.

dn, 3rd, Northern Pacific, Mullan Tunnel, Mont., passenger train No. 3 derailed at a point where track repairs were in progress. The engine and first three cars were badly damaged by falling against the walls of the tunnel. The train was near the middle of the tunnel and was running at good speed.

unx, 3rd, Pittsburgh, Johnstown, Ebensburg & Eastern, Dougherty, Pa., passenger train derailed and the passenger car overturned. The occupants of the car, including the General Manager of the road, were injured, but none of them very seriously.

bc, 4th, Pennsylvania road, Boughton, Pa., butting collision between passenger train No. 14 and a local freight, badly damaging both engines; one engineman injured.

o, 4th, Philadelphia & Reading, Bound Brook, N. J., locomotive of passenger train damaged by breaking of siderod; fireman fatally injured.

rc, 5th, Delaware, Lackawanna & Western, Lowman, N. Y., a freight train ran into a work train; five employees injured. There was a dense fog at the time.

bc, 5th, 2 a.m., Pittsburgh & Western, Warren, Ohio, butting collision of freight trains, one of which was drawn by two engines; engines and 12 cars wrecked; two trainmen injured.

bc, 5th, Chicago, Burlington & Quincy, Canton, Ill., butting collision between passenger train and freight; two trainmen and several passengers injured.

xc, 5th, Rock Falls, Ill., freight of Chicago, Burlington & Quincy, ran into gravel train of Peoria & Northwestern at the crossing of the two roads; seven cars were wrecked; one employee killed and four injured.

xc, 5th, Rock Falls, Ill., freight of Chicago, Burlington & Quincy ran into gravel train of Peoria & Northwestern at the crossing of the two roads; seven cars were wrecked; one employee killed and four injured.

xc, 5th, Dallas, Texas, freight train of the Texas & Pacific ran into passenger train of the Atchison, Topeka & Santa Fe at the crossing of the two roads, overturning the freight engine and wrecking the mail car and two other cars of the passenger train. A mail clerk was killed and one other trainman was injured. Fifteen horses in a freight car were killed.

unf, 6th, Southern Ry., Wilkesboro, N. C., a freight train was derailed at a misplaced switch and the engine was ditched.

Within a short time afterward another freight was derailed at Rural Hill, three miles from the scene of the first wreck, in a manner almost identical. It is believed that both switches were maliciously misplaced by the same person.

unf, 6th, 9 p.m., Seaboard Air Line, Frisbee, Ga., freight train derailed at a misplaced switch; engine and several cars wrecked, three trainmen killed. It is believed that the switch was maliciously misplaced.

bc, 8th, Wheeling & Lake Erie, Navarre, Ohio, butting collision of freight trains, wrecking both engines and many cars; one trainman injured.

xc, 8th, Northern Pacific, Jamestown, N. D., collision between a mixed train and an empty engine. A platform car in the mixed train, next behind the engine, carrying 17 workmen, was crushed and five of the workmen were killed. Six others were injured, two of them fatally. The engineman of the mixed train stated that he was unable to control his speed with the air-brakes.

unf, 8th, Chicago & Alton, Whitehall, Ill., a freight train broke through a bridge which had been weakened by fire, making a bad wreck. A drover was injured.

unf, 8th, Pennsylvania road, Parker's Landing, Pa., a freight train was derailed by running over a cow; and several cars were wrecked. A car containing naphtha caught fire and exploded, and, with 23 other cars, including seven loaded, was burned up. The engineman was fatally injured and four other trainmen were badly hurt.

unx, 8th, Escanaba & Lake Superior, freight train derailed and several cars wrecked. Some days after the accident the dead body of a man, presumably a tramp, was found in the ruins.

xc, 9th, Southern Ry., Charlotte, N. C., collision of switching trains; fireman killed.

eq, 9th, Baltimore & Ohio, Glover's Gap, W. Va., passenger train No. 5 was derailed by the breaking of the flange of one of the wheels of the engine. The engine was overturned and the first three cars were wrecked. The engineman and fireman were killed and three other trainmen were injured. The wreck took fire and was mostly burned up.

rc, 10th, 7 p.m., Philadelphia, Wilmington & Baltimore, Landlith, Del., an express train which had been stopped before it reached the station, on account of the presence of another passenger train at the station, was run into at the rear by a following passenger train, wrecking the engine and two baggage cars. Eight passengers and three trainmen were injured.

dn, 11th, Great Northern, Wellington, Wash., a freight train of 40 cars which had become uncontrollable on the steep grade descending from the Cascade tunnel was derailed at a curve and 32 of the cars were wrecked. The wreck took fire and a large part of it was burned up. The engineman and fireman, one other employee and a tramp were killed and the conductor was injured.

bc, 11th, Central Vermont, East Granville, Vt., butting collision between a freight train and a work train; both engines wrecked, six employees injured, two probably fatally.

bc, 11th, Central of Georgia, Lavender, Ga., butting collision between southbound freight and northbound passenger trains; both engines and one car damaged; one engineman killed and two other trainmen injured.

unx, 11th, 10 p.m., Chicago, Rock Island & Pacific, Whitewater, Kan., freight train derailed and several cars damaged. One of the cars contained gasoline, which exploded, and the resulting fire destroyed 10 cars and their contents; engineman and fireman injured.

unx, 12th, 5 a.m., Southern Ry., Atlanta, Ga., switching freight train derailed; conductor killed, one brakeman injured. An overhead bridge was damaged.

xc, 12th, Philadelphia & Reading, Shamokin, Pa., a freight train which had become uncontrollable on a steep descending grade collided with a standing freight in the yard, wrecking a caboose and six cars. The wreck took fire and was slightly damaged.

dn, 12th, 2 a.m., New York Central & Hudson River, Eastwood, N. Y., a westbound express train was derailed at a misplaced switch and the engine and first four cars were overturned. Two trainmen and many passengers were injured. It is said that the engineman disregarded a distant signal set against him.

bc, 15th, Chicago, Milwaukee & St. Paul, near Eggleston, Minn., butting collision of freight trains, wrecking both engines and several cars; two trainmen killed, two injured. It is said that the northbound train disregarded a telegraphic order which had been given to it directing the trains to meet at Eggleston station. There is a belief that the engineman of this train had died of heart disease. The fireman on this train was making his first trip over the road.

bc, 15th, Buffalo, Rochester & Pittsburgh, Scottville, N. Y., butting collision between fast freight train No. 31, southbound, and northbound freight No. 68, damaging both engines and wrecking four freight cars. It is said that the conductor and engineman of No. 31 failed to identify a train which was on the side-track at the last station which they had passed. They took the word of some unauthorized person that it was No. 68, when in fact it was another train.

rc, 16th, 1 a.m., Pittsburgh, Cincinnati, Chicago & St. Louis, Ridley, Ind., southbound passenger train ran into the rear of a preceding freight, damaging the engine, baggage car and several freight cars. It appears that the freight met another freight at this station and also should have waited for the passenger train, but that after the northbound freight had passed, the southbound was at once moved from the siding to the main track, evidently in entire forgetfulness of the passenger train.

xc, 16th, Louisville & Nashville, English, Ky., collision between passenger train No. 4 and a work train, wrecking caboose and three freight cars. Two employees fatally injured. It is said that the conductor of the work train made a mistake of 10 minutes in reading the time in an order which had been given him allowing the use of a part of the passenger train's time.

unf, 17th, Pittsburgh, Cincinnati, Chicago & St. Louis, Piqua, Ohio, a work train, the engine of which was running tender first, was derailed by running over a cow. The engineman was killed and the fireman injured.

bc, 18th, Illinois Central, Abbeville, Miss., butting collision of freight trains, wrecking both engines and many cars; four trainmen killed and three injured. It is said that a telegraphic order given to the northbound train was misread.

bc, 18th, Chicago, Milwaukee & St. Paul, Prairie du Chien, Wis., butting collision of freight trains, one engineman killed.

xc, 18th, New York, New Haven & Hartford, Avon, Mass., a southbound freight, on the northbound track, was carelessly run forward through a crossover, fouling the southbound main track just as a passenger train of three cars and an engine was passing at full speed. The passenger cars were overturned in the ditch and wrecked. Six passengers were killed and 25 injured. A brakeman of the freight had straightened one of the two switches of the crossover and intended to straighten the other, but he went and set a switch for the side-track a short distance south and then, assuming that he had made a clear road, he motioned the engineman to come forward. The engineman who was too close to see, from his cab, that the crossover switchstand, on his left, was wrong, neglected to verify the brakeman's assurance that the road was clear.

xc, 18th, 7 p.m., Chicago & North Western, Princeton, Wis., passenger train ran over misplaced switch and into a freight car standing on a side-track; one employee killed, two injured.

unf, 19th, 1 a.m., Wrightsville & Tennille, Yonkers, Ga., a wrecking train broke through a trestle bridge which had apparently been weakened by a flood, and fell, with the wreck of the bridge, to the creek, 30 ft. below. Of the 50 persons on the train only three were injured, and they but slightly.

unx, 19th, Pittsburgh, Fort Wayne & Chicago, Dunkirk, Ohio, freight train derailed; engine and 20 cars of cattle wrecked.

unx, 19th, Philadelphia & Reading, Topton, Pa., special passenger train, consisting of engine and two cars, derailed; cars overturned. Twenty-five passengers injured, most of them slightly.

unx, 19th, Eastern of Minnesota, Duluth, Minn., passenger train moving slowly was derailed at the junction with the Northern Pacific on a trestle bridge and the tender and mail car were badly damaged. It appears that at the facing point switch the engine took one track and the tender the other.

dn, 19th, Illinois Central, Springfield, Ill., passenger train derailed at a derailing switch; engine overturned and first two passenger cars badly damaged.

rc, 20th, Northern Pacific, Lake, Wash., rear collision of passenger trains; several passengers injured, one probably fatally.

dn, 20th, Pere Marquette Road, Wayne, Mich., several cars of a southbound freight were wrecked by the emergency application of the air-brakes, and three men riding on a coal car were killed; a fourth was injured.

xc, 20th, Boston & Albany, Warren, Mass., an eastbound gravel train running at full speed, with the caboose in front, collided with a switching freight train backing westward, crushing the caboose and several cars; three employees killed, 23 injured. The freight appears to have been switching outside the yard limits west of the station without properly protecting itself against the gravel train. A brakeman of the freight went back to set a switch for a mill siding, and after setting it for his train to back in, he went some distance from the main track to remove the safety block from the rails of the siding; while he was here the gravel train came on and he was unable to display his flag where it could be seen. The automatic signal for the section of road in which this switch is situated is over two miles in the rear (westward); but it appears that the switch was changed, setting that signal in the stop or caution position, before the gravel train passed it; so that this train must have disregarded the signal.

unx, 20th, Texas & Pacific, Hawkins, Texas, passenger train No. 6 was derailed and all of the coaches were overturned. Three passengers were injured.

unx, 20th, Denver & Rio Grande, Burnito, Colo., work train derailed and several cars fell into a river; one employee killed and three injured.

bc, 21st, Cleveland, Cincinnati, Chicago & St. Louis, Lawrenceburg, Ind., butting collision between a passenger train and a freight, badly damaging both engines; one fireman killed, one engineman fatally scalded and four other trainmen injured.

xc, 21st, Dubuque, Iowa, collision of freight trains of the Chicago, Milwaukee & St. Paul and the Illinois Central at the crossing of the two roads; one engine and seven loaded cars wrecked.

unf, 21st, Pittsburgh & Western, Covers, Pa., freight train derailed by a stump which had been accidentally blown on the track by workmen blasting for a new street railroad nearby.

rc, A second freight immediately following ran into the rear of this train, wrecking the caboose and 10 cars.

o, 21st, Pennsylvania road, Milton, Pa., a car in passenger train No. 1 was set afire by the explosion of the tank containing gasoline for illuminating the car; one trainman burned.

bc, 22nd, 10:30 p.m., Grand Rapids & Indiana, Bonds Mill, Mich., butting collision between regular passenger train and a freight train, resulting in the death of the engineman and brakeman of the freight train, and serious though not fatal injuries to the engineman and conductor of the passenger train. None of the passengers received other than very slight bruises. The men in charge of the freight engine forgot about the passenger train.

xc, 22nd, Pennsylvania, Bryn Mawr, Pa., an eastbound freight became uncontrollable on a descending grade and ran at high speed to West Philadelphia, where it collided with a string of cars of coal, wrecking a dozen of them. The engineman jumped off and was injured.

rc, 23rd, Erie road, Hornellsville, N. Y., freight train entering the yard was run into at the rear by a following freight, and the caboose was wrecked. One conductor was killed.

dn, 23rd, Colorado & Southern, Kenosha, Colo., a freight train became uncontrollable on a steep grade and at a sharp curve was derailed, many cars falling down a very high bank; engineman killed, 18 other employees, most of them laborers, injured.

unf, 23rd, Northern Pacific, Jocko, Mont., freight train derailed by landslide, wrecking several cars; fireman killed, two other trainmen injured, one of them fatally.

bc, 24th, Central of New Jersey, Somerville, N. J., butting collision of passenger trains; a number of passengers slightly injured. The eastbound train was an express of the Philadelphia & Reading using the C. N. J. track on account of an obstruction on the Philadelphia & Reading, and was in charge of a pilot. The collision occurred on a part of the line where single track rules were temporarily in force, and the responsibility appears to rest on the eastbound train.

unf, 24th, Nashville, Chattanooga & St. Louis, Marietta, Ga., a pay train consisting of three cars was derailed by a malicious obstruction and the engineman and fireman were injured.

o, 24th, Michigan Central, New Buffalo, Mich., locomotive of freight train wrecked by explosion of its boiler; fireman killed and engineman and one brakeman injured.

rc, 25th, 11 p.m., Southern Railway, Columbia, S. C., passenger train ran into the rear of a preceding freight, wrecking engine, caboose and three cars. The wreck took fire and was partly burned up. Three passengers and two trainmen injured.

xc, 25th, Oregon Railroad & Navigation, Fairfield, Wash., passenger train ran into switching freight train, damaging both engines and wrecking three freight cars; eight passengers injured.

unx, 25th, Atlanta, Knoxville & Northern, Ducktown, Ga., a work train, the engine of which was running backward, was derailed, and six cars were wrecked; fireman killed, engineman fatally injured.

bc, 26th, Mobile & Ohio, Brookhaven, Miss., butting collision of freight trains, wrecking both engines and several cars. It is said that an order given to the southbound train was forgotten.

xc, 26th, 5 a.m., Pacific Junction, Mo., a freight of the Missouri Pacific ran into a freight of the Kansas City Southern at the crossing of the two roads, wrecking several cars. A man stealing a ride was killed and another was injured.

unx, 27th, Pere Marquette, Plymouth, Mich., car in a freight train derailed and overturned; and seven men, one woman and 11 race horses in the car were injured. The people in the car were asleep at the time of the derailment and their injuries were due chiefly to the kicking of the horses.

unx, 27th, Wabash, Mineola, Iowa, passenger train No. 3 was derailed and all of the six cars in the train fell down a bank and were overturned. Nineteen passengers were injured, three of them probably fatally.

rc, 28th, 4 a.m., Great Northern, Penn, N. D., rear collision of freight trains, wrecking many carloads of cattle; three trainmen killed, one injured. There was a dense fog at the time. The wreck took fire and 25 cars were burned up.

bc, 28th, Chicago Great Western, Baxter, Iowa, collision between a freight train and an empty engine, wrecking two engines and nine cars. The wreck took fire and was mostly destroyed; four trainmen injured by jumping off. It is said that the empty engine was on the main track without orders.

xc, 28th, 4 a.m., Illinois Central, Memphis, Tenn., collision of switching trains in the yard; fireman killed.

unf, 28th, 1 a.m., Seaboard Air Line, Cameron, N. C., passenger train No. 34 was derailed and the engine, two express cars and two passenger cars were wrecked. The engineman, fireman and six passengers were injured. It is said that the spikes of the track had been maliciously loosened.

xc, 29th, 2 a.m., Erie road, Allendale, N. J., freight train on a descending grade broke in two and the rear portion afterward ran into the forward one, derailing 20 cars. A brakeman was killed.

unf, 29th, 10 p.m., Central Vermont, Burlington, Vt., a passenger train was derailed at a washout, and most of the cars were ditched.

bc, 30th, about 5 a.m., New York, New Haven & Hartford, Long Hill, Conn., butting collision of freight trains, both running at full speed. Both locomotives and many cars were wrecked. One engineman, one fireman and

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*The *Railroad Gazette* monthly train accident record is now made up in a form somewhat different from that formerly used. Accidents in which injuries are few or slight and the money loss is apparently small, will usually be omitted from the list. The tabular statement of totals will be omitted entirely, as a more complete report of the total number of accidents occurring will probably be published by the Interstate Commerce Commission. The separation of the classes is abandoned, but the classification will be indicated by the use of the following

ABBREVIATIONS.

rc	Rear collisions.
bc	Butting collisions.
xc	Miscellaneous collisions.
dr	Derailments; defect of roadway.
eq	Derailments; defect of equipment.
dn	Derailments; negligence in operating.
unf	Derailments; unforeseen obstruction.
unx	Derailments; unexplained.
o	Miscellaneous accidents.

The third class, "xc," includes collisions due to trains breaking in two and the rear portion subsequently running into the forward one.

one brakeman were killed and three other trainmen were injured. The southbound train, an extra, should have stopped at Stepney, two miles north of Long Hill, so as to clear the schedule time of the northbound; but the engineman forgot about the regular train. The conductor and brakeman tried to stop the train but their efforts were ineffectual. Local newspapers stated that the forgetful engineman had had but six hours sleep in the 60 hours next preceding the collision, but the officers of the road subsequently said that he had had nine hours' rest within the 24 in which the collision occurred.

xc, 30th, Pennsylvania road, Fern Glen, Pa., the engine of a freight train which had been detached from its cars, on a descending grade, in order to run ahead with a man to turn a switch, was run into by the cars of the train and was pushed down a bank. The engine and several cars were wrecked. The engineman was killed.

eq, 30th, Seaboard Air Line, McKenny, Va., a freight train was derailed by a brake-beam which fell on the track, and 14 cars fell down a bank and were wrecked. Two men stealing a ride were killed and three were injured.

A Baldwin Freight Engine of 1847.

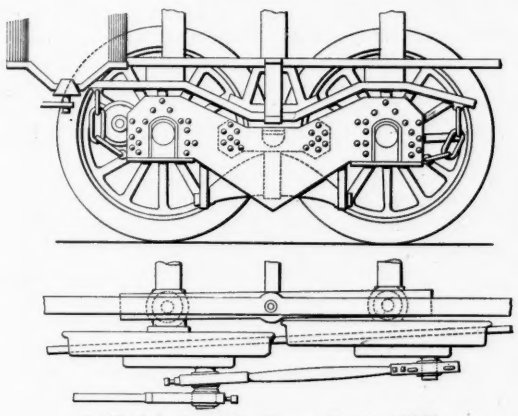
BY C. H. CARUTHERS.

Somewhat early in American railroading engines with but a single pair of driving wheels, and truck at front end, or of two pairs of drivers without truck, were followed by engines having three pairs of drivers, connected, and no truck. Then a new difficulty presented itself. The crude tracks caused these six-wheel connected engines to round the sharper curves with difficulty.

Various plans to surmount this objection to the six-wheel engines were tried, but that which proved most efficient was devised by M. W. Baldwin, in 1842, and not only gave engines of the six-wheel connected type the foremost place as freight engines, but also enabled still larger engines having eight drivers connected to be successfully used on the tracks of those earlier roads.

This truck, as Mr. Baldwin called it, is familiar to the older railroad men, as it was applied to many engines as late as 1865, but a brief description may not be uninteresting to those who have come into the service since that time, although it is shown in detail in a number of books on the locomotive.

The principal part of it consisted of two frames, one on the right hand side and the other on the left hand side of the engine. Each of these frames was formed of two broad plates of iron standing vertically and at a uniform distance apart of about 6 or 7 in. The ends of these plates were shaped like the pedestal of the present pressed steel car trucks and were riveted to castings in which the axle boxes were carried, and after the boxes were in position a short piece was bolted across the opening below. These castings were bored out vertically on a lathe, each half forming the segment of a circle. The axle boxes were turned to a corresponding segment on their



Baldwin's Flexible Beam Truck—1842.

sides. The center of each frame so formed, contained a casting which received a large pin attached above it to the central band of a large half-elliptic spring, the ends of which were attached by stirrups to the engine frame. In later engines this spring was placed low down between the plates forming the truck frame, its ends attached to the plates of the truck frame and its center to the central thrust pin as before, only in this position the spring, of necessity, was placed in an inverted position; that is, with the long leaf underneath. This arrangement of truck frame was exactly alike on each side of the engine. Nothing except the axles and a bar across from one center pin to the other, united the two sides of this truck.

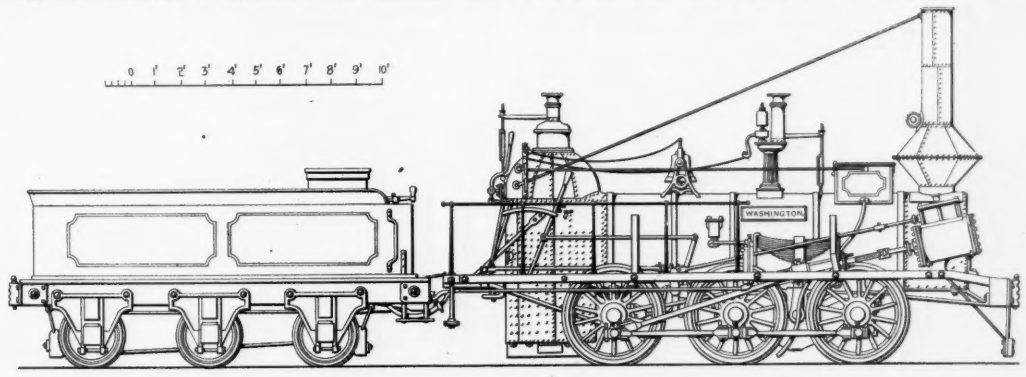
The brasses for the parallel rods on the two pairs of wheels carried in this truck were not placed in direct contact with the strap and the end of the rod but were turned to fit between two pieces of iron which had been bored vertically to form segments of a circle, on the same plan as followed in fitting the axle boxes, and the whole was then put into the strap on end of rod.

Thus it will be seen that the engine so arranged could, by means of the large amount of lateral motion so obtained, readily round sharp curves while running under steam, and also accommodate itself to the inequalities of the permanent way, as the only points of attachment to the main frame were the two large pins, one in the center of each truck frame; and these were made with ends of ball-and-socket type, thus permitting vibration vertically of either side independently. Some of the later engines built with this vibrating truck retained it as late as 1880.

The engine Washington, shown in the engraving, was one of the earlier engines built with this improvement. M. W. Baldwin completed the Washington early in 1847, it being his 293rd engine.

It was built for the Harrisburgh & Lancaster R. R., and ran upon that line until transferred with several others to the Pennsylvania R. R., on Oct. 16, 1849, and continued in the service of the latter company, principally as a shifting engine, until 1859, when it was retired from service and cut up. Immediately upon entering the service of the Pennsylvania it received a cab which covered the footplate and almost the entire dome; a large "balloon" stack replaced the one shown in the cut, and both a headlight and a cowcatcher were supplied. During the later years of its service a column with the whistle on the top replaced the combination of whistle and safety-valve as shown. Otherwise the engine remained as first constructed. The smokestack shown was almost exactly the same as the diamond stack still used on some roads, except that it was inverted; and the straight section was hinged with a peculiar spring hinge, and by means of the rod shown, could be lowered to permit the passage of the engine through some of the low-roofed covered bridges then in use.

The pump barrel, as will be seen, formed the guide for the piston; and the plunger rod was attached to the piston by a casting attached to it. The valve motion consisted of D hooks without any independent cut-off. The usual rod extended from the main rockers to auxiliary rockers under the footplate; and the upper arms of these rockers formed sockets in which hand levers could be inserted by means of which the engine could be moved in making couplings when the hooks were out of gear. The hooks were connected to the arms of the tumbling shaft



Baldwin Locomotive "Washington"—1847.

by short links; and the lower openings in these links were slotted to allow for the radial motion necessarily imparted to the pins by the rocker arms when the hooks were on them.

When first built the Washington had no jacket of sheet iron over the wooden lagging of the boiler. This lagging was held in place by bands of brass and was painted green, the color used on all other parts of the engine.

The cylinders were placed high and at quite an angle. They were cast with a side piece on each which, on its top, formed a concave segment of the circle described by the circumference of the boiler. These side pieces, however, did not meet in the center, but the space was fitted with a sort of distance piece and the whole then bolted to the smoke-box. This arrangement probably led to the designing of the present saddle-casting which it very closely resembled. This feature of Mr. Baldwin's engine, in connection with his patented vibrating truck already described, gave him quite an advantage over several of his competitors who were building engines somewhat like the Washington, but were using square smoke-boxes, and all three pairs of driving wheels placed in rigid pedestals.

The fire-box of the Washington was of the horseshoe type, surmounted by a "haystack" dome, and this, in turn, by a smaller dome of cast-iron.

The arrangement of the wheels was good, and the only possible objection to the engine was the length of piston rod necessitated by Mr. Baldwin's combination of pumps and guides in one piece. This would undoubtedly tend to produce excessive vibration in the small-sized rod used.

The tender was of the ordinary type carried on three pairs of wheels, all of which were held in place by pedestals of cast-iron bolted rigidly to the frame. The cistern held about 1,300 gals. of water, and there was sufficient space for the fuel (wood) to make the short runs between supply points of those far-off days.

The principal dimensions of the engine were:

Cylinders	13 in. x 18 in.
Drivers	46 in. dia.
Weight (all on drivers)	34,675 lbs.
Boiler	36½ in. diameter
Fire-box	36 in. long inside

Two others, Lewistown and Chester, bearing construction numbers 291 and 292, respectively, were built in March, 1847, for the Columbia & Philadelphia R. R. They were like the Washington in every respect. A few years later the railroad company rebuilt the Lewistown and removed the first pair of drivers, substituting a four-wheel truck.

In May, 1845, the Atlas (M. W. B., No. 232) was also built for the Columbia & Philadelphia R. R. While on the same general lines as the Washington, it was slightly larger, and had 13½-in. x 22-in. cylinders and 48-in. driving wheels.

These three engines also came into possession of the Pennsylvania Railroad Company when that company purchased the State of Pennsylvania's public improvements, Aug. 1, 1857; and the Chester was soon sold by the railroad company, but the Atlas and Lewistown remained in service until worn out in 1861.

Foreign Railroad Notes.

On the railroads of France, signalmen, trainmen and other employees who have duties in connection with train movements must henceforth have at least one day off every two months (or half a day each month); and every man must have at least nine hours uninterrupted rest every day, which, however, may be reduced to eight hours for those who lodge on the companies' premises. One hour must be allowed in the middle of the day for meals. The ordinary day's work must not exceed 12 hours; and whenever this limit is exceeded the government will inquire into the case. These regulations are embodied in a decree recently issued by the Minister of Public Works. The order is to go into effect Jan. 10. In connection with this notice it is to be borne in mind that the seventh day of rest does not exist in France.

The Railway and Canal Commissioners of Great Britain, deciding on the complaint of excessive rates on coal shipped from mines in Scotland, hold that the railroad companies have failed to justify the increases which were made Jan. 1, 1900, and must desist from charging them hereafter. The shippers claim refunds for past overcharges, but on this point the commissioners have continued the case for further investigation. This decision is based on the law of 1894, which prescribed rates rigidly and leaves the railroads little discretion; though it is said that the increases now complained of were fully within the statutory powers of the railroad companies. The advances were made because the cost of materials and the expenses of conducting transportation had largely increased. There appears to be no disagreement as to this fact, but the court evidently required the railroads to show exact statistics to prove that the cost of carrying coal was greater on Jan. 1, 1900, than it was at the time the former rates were established. *Transport* characterizes this effect of the law of 1894 as "scandalously oppressive."

The Emir of Buchara, which is a vassal state of Russia, through which the Asiatic Midland passes, has built, at his own expense, a branch railroad from the town and station of Buchara. The Midland is to supply the rolling stock and work the new branch, and turn over the net earnings to the Emir.

The Congo Free State contemplate connecting the head of navigation of the Congo, Stanleyville, with Lake Albert Nyanza on the north and Lake Tanganyika on the south by a railroad, which would be about 625 miles long. From Stanleyville steamers have unobstructed navigation down the Congo to the existing railroad, which unites the upper with the lower navigable course of that great river.

The Jungfrau Railroad Co. has let to a firm consisting of three Italians the work of tunneling on the next section for a fixed price of 370 francs per running meter = $21.95 per running foot. The cost to the company, which had been doing the work directly, had been estimated as high as 1,000 francs per running meter.

The Swiss trainmen's union, 1,794 strong, has petitioned the Swiss railroad companies to keep the car couplings and hand brakes in better condition, to pay more attention to brakes and the shelters for brakemen, and also to take more care of the Westinghouse brakes. The companies are said to have made a satisfactory response.

The Southern Chinese enterprise for which the French have authority is to be built by the Indo-Chinese government itself from Haiphong to Hanoi and Laokai, 239 miles. The extension from Laokai to Yunnan-fu, 291 miles, is to be built by the concessionaires at their own cost and risk; and the lines built by the government will then be leased to them for 75 years. They are to issue a loan of $15,000,000 3 per cent. bonds, guaranteed by the colony and by France. The other $5,000,000 of the cost is to be advanced half by the colony and half by the company.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

It is pleasant to observe the interest that has been stirred up in the Southern States in the matter of improving public roads, and it would not be amiss if a similar interest were created in a good many regions of the North. It is pretty well recognized that good roads are the fundamentals of civilization and prosperity, but the methods of country road building and maintenance in much the greater part of our country are crude and wasteful. A few months ago considerable interest was aroused by the pilgrimage through certain Southern States of the Illinois Central "good roads train," and as we have quite lately noted, the Southern Railway has just started out a similar train. By way of helping on this movement we print in another column part of an address by Mr. Hunter McDonald, Chief Engineer of the Nashville, Chattanooga & St. Louis, which was intended to help his fellow citizens in Tennessee in the matter of getting better country roads. What he says is, however, of pretty general application. Most of us know of localities in the Middle West and in the Eastern States where the methods of maintenance that he speaks of are in vogue.

The telegram announcing that the last rail was laid last week on the Eastern Chinese Railroad, completing a connection across Asia to Vladivostock, surprises even those who have followed closely the progress of the Siberian Railroad; and this surprise is not lessened by the statement of the Czar, in acknowledging the announcement that it is hoped that the line will be open to public traffic "in about two years." It is not easy to understand a condition of things which requires two years more work on a railroad after the track is all laid before it can be open for traffic. Very little news has come from this railroad since the Chinese uprising, by which a great deal of completed line was destroyed. The Russians had depended chiefly on Chinese labor for earthwork and some other construction; and it has been assumed that this labor has been pretty thoroughly frightened away by certain events on the Amoor last year. But this may well be an error. There are a great many Chinese, and they have a great appetite for work when they are paid for it. It must be remembered that work on this road was prosecuted from four termini at once; from the junction with the Siberian Railroad eastward; from Vladivostock westward, and from the Sungari River, half way between, both eastward and westward. The materials and supplies for all but the westernmost working party came through Vladivostock and largely from this country; for the Sungari going northward from Vladivostock over the Ussuri Railroad (the part of the Siberian Railroad first built) 550 miles to the Amoor, thence by steamer up the Amoor to the mouth of the Sungari, and thence up the Sungari to the railroad crossing at Harbin. The Russians have heretofore accomplished feats of rapid railroad building, equal, perhaps, to anything done in this country, notably on the Trans-Caspian line, now called the Asiatic Midland. At the time of the Chinese outbreak about 16 months ago, about 800 miles of track remained to be laid on the Chinese Eastern; but considerable work had been done on the roadbed; then also a very considerable amount of work was required to restore the line destroyed by the Boxers.

The proposition to abolish all free transportation fell through (as was to be expected, as a matter of course); but the presidents of the Trunk Lines have passed a significant resolution which may prove to be a very respectable beginning. They have voted to discontinue the practice of exchanging passes for officers and employees. This applies to all railroads in trunk line territory (east of Buffalo and Pittsburgh). The resolution takes effect Jan. 1, and covers both season and trip passes. We do not suppose this is sure to result in the total abolition of "exchange annuals," and certainly there will be exceptions in the matter of trip passes; but it ought to be a good thing in spite of this incompleteness. Exchanges between roads of equal length and importance may be more or less justifiable, as also those between roads closely connected as partners in through business, or by reason of ownership; but between big roads and little ones the word "exchange" is almost a misnomer, for there is usually nothing equitable about the transaction. The continuance of the existing custom, as far as roads west of Buffalo and Pittsburgh are concerned, will, no doubt, be a considerable obstacle in the way of the successful carrying out of the new agreement. A scheme of this kind is somewhat akin to that of abolishing commissions on tickets. It is to be hoped that the present project will not require quite so many weary years for its consummation as did the ticket-commission reform.

The Austrian Minister of Railroads appeals to the several railroad companies of the country to give out orders more freely for machine tools and other supplies, in order to keep the manufactories busy; and this is the course he himself is following with the State Railroads which he is managing. Nearly all of these railroads have reduced earnings, and consequently less money to spend and less immediate need of new equipment, etc.; but it is argued that prices have fallen so much that it would be a real economy to buy now for future needs. It is natural to test this proposed policy by the results which would have followed if it had been applied at the beginning of other periods of declining industrial activity. Usually the fall in prices the first year after the culmination of the "boom" is followed by still lower prices the next year, and so on till the turn comes; and the railroad which should stock itself with unneeded tools and rolling stock would find that by the time it needed them it could get them for materially lower prices than it had paid, to say nothing of two or three years interest thrown away. It is safe to say that such a policy followed here after 1873, 1881, and 1893 would have bankrupted many railroads. Further, it is evident that if more is bought this year than is needed, there will be so much less to buy next, when too the factories will need some orders. The policy seems founded on the assumption that the depression in business will not last more than a year anyway. If the Austrian Minister has means of knowing things like this, he would be worth about twenty millions a year in this country.

Slipshod habits in hand-signaling, which were discussed in an editorial in these columns a few weeks ago, are the subject of a number of comments from general and division superintendents on the first page of this issue. It will be seen that the general prevalence of the irregularities which were mentioned is pretty well recognized; but as to what can or ought to be done to cure them, the views of the writers are not so clear, except on one or two points. The suggestion that a handkerchief be used, for the purpose of providing, for day signaling, a small, clearly defined, conspicuous object, such as we have in a lantern at night, strikes us as sensible. Not everybody will agree with H. S. W. that the air whistle should always be used for the go-ahead signal. Passenger trainmen here and there use handkerchiefs already. What success a trainmaster would have in making all his conductors and brakemen always have *perfectly white* handkerchiefs in their pockets, might be a question requiring some time to settle. The white-flag rule seems to be satisfactorily complied with, on most roads, if an engine is supplied with two cloths which (apparently) have been used a week or two by the wipers; but for really important signaling that kind of whiteness would not answer. There is one difficulty that frequently occurs in yard signaling which has not been mentioned by any of the writers, and that is the uncertainty which arises when the direction in which the engine faces has to be changed. In a case recently brought to our attention a yard crew used, in the forenoon, an engine headed east, while in the afternoon the same men, doing the same kind of work, at the same place, used an engine headed west. When the conductor wished to have the engine "pull out," what signal should he give? Go ahead? or "Back up?" Either one, if right in the morning, would be wrong in the afternoon. We can rest assured that the men who did the work, readily found a convenient way to do the signaling; but the question is, can they do it in strict conformity to the standard code? If any reader wishes to present his view of the best way, we shall be glad to hear from him. In the meantime, a hint may be found in one of the hand-signaling rules of the standard English code, which reads (italics are ours):

> In shunting operations by night, or when necessary in foggy weather or during falling snow, a white light waved slowly up and down means "move forward," i.e., *go away from the person giving the signal;* a white light waved slowly from side to side across the body means "move back," i.e., *come towards* the person giving the signal.

The "Car Famine."

The reader is doubtless acquainted with the fact that freight blockades are now causing great trouble in most of the large cities of the country, and in many small ones. For several weeks both shippers and consignees of bulk freight of all kinds have been put to constant inconvenience, amounting to losses of trade and shutting down of workshops. That gluts of both merchandise and coarse commodities are always most serious at this time of year, is familiar knowledge to everybody acquainted with freight traffic, but the complaints which reach the newspapers, of the same kind as those of former years, indicate that most merchants and manufacturers still act on the old idea that the railroad is the only party that is at all responsible for the congestions which occur whenever business is unusually active. In Pittsburgh, which is perhaps the greatest bulk-freight center in the world, the difficulties during the past two or three weeks have become so acute that the Chamber of Commerce has taken the matter up and has appointed a committee to deal with the problems involved.

We are not going to discuss these problems now, for they are too complex and too exclusively dependent on local conditions to be susceptible of intelligent treatment at long range; but in view of the monotonous one-sidedness of all the news items which appear, we want to quote a word on the other side—the railroad side. It is in the shape of an interview reported in a New York paper, with Vice-President McCrea, of the Pennsylvania Lines West of Pittsburgh. Mr. McCrea says:

> "In reply to the criticisms which have been made as to car shortage and inadequate freight service, during the latter half of this year the volume of business has exceeded that of the same period of last year by nearly 20 per cent., when the amount of business offered was regarded as abnormal. The congestion at Pittsburgh is due to the rebuilding of the Union Depot, the rebuilding of the Fort Wayne Bridge and the widening for four tracks in the 'Panhandle' yards for two and one-half miles. About $10,000,000 is being expended by the company within the limits of the city of Pittsburgh. Freight is piled as high as the freight house because of the inability of consignees to get teams to haul it away. This is true of many other cities as well as Pittsburgh. The Pennsylvania Lines East and West of Pittsburgh have 19,000 cars under contract for delivery, and for the Lines West 115 locomotives and the Lines East not less than 150 locomotives have been ordered. Besides, on the Lines West, 20 locomotives that were due for delivery in July and August have not yet been received. It is said that the ground alone which the Pennsylvania intends to purchase for freight yards in Pittsburgh will cost between $4,000,000 and $5,000,000."

The remarks about packed freight houses and insufficiency of horses have a general as well as a local application. One impediment which is peculiar to the Pittsburgh region, or at least much worse there than elsewhere, is the disablement of locomotives, from bad water, in consequence of drouth. This has caused trouble there before, when the water in the rivers were low. An officer of the Pittsburgh & Lake Erie reports that a number of engines of that company are out of service for this reason. Water has now to be carried in cars long distances, and there is

no relief until rains shall come to dilute the streams and wash out the pools in which acids washed out from the mines have accumulated.

Separate Cars for Consumptives.

The demand that persons sick with tuberculosis of the lungs shall, when traveling on railroads, be separated from the other passengers, is again being agitated in the West, and the Transcontinental Passenger Association had it up for formal discussion at a meeting in St. Louis this week. A complaint is being presented to the railroads by the Travelers' Protective Association, an organization of traveling salesmen. This danger, or affliction, or whatever it may be called, is most serious in the regions west of the Missouri River, Colorado, New Mexico and Arizona being full of resorts for this class of invalids.

The demand for more rigid hygienic measures on passenger trains has been agitated, mildly, for years; especially by essayists at physicians' conventions. It is one in which everybody should feel a deep interest for the ravages of this disease are familiar and the dangers of contagion have been explained in much detail in all sorts of publications. It is obviously unscientific for passengers who are well to ride for hours in the same car with a consumptive patient, for that means the constant danger of spreading the most destructive disease now afflicting the inhabitants of the earth. For this practice to go unchecked is a defect in our civilization which not only the doctors, but railroad men and every intelligent citizen must recognize. But the remedy is not easy.

That railroad cars can be very effectually fumigated and otherwise cleansed, is evident from what has been done in the Southern States during epidemics of yellow fever. The Pullman Company has been credited with carrying out very thorough and scientific regulations in the south, and, indeed, on all its lines. The appearance of its cars and the discipline of its men indicate that the management is intelligent and that orders are obeyed. On railroads running trains from the southern states to the north during the last yellow fever epidemic ordinary passenger cars were sterilized in a way which appears to have been successful. The introduction of formaldehyde and of improved processes has made the use of hygienic processes much easier than in former years. The improvement in general cleanliness on cars has trained up a better class of men, so that the officer who sets out to fight disease has not so much inertia to overcome. So far as preparing the cars is concerned, therefore, any railroad ought to be able to do its full duty.

Trouble arises, however, when we come to administration. But very few consumptives will ride on any train, and many trains have none at all. Even in Colorado and New Mexico the sick travel very irregularly. Where does the consumptive passenger get on? Perhaps at Chicago one day and St. Louis the next. Can a railroad reasonably keep a separate car standing at the station, even in a big city, waiting for individuals of such a small class? Can it run a compartment on every train, or even on one train a day, when it will probably be empty nearly all of the time? In the south the provision of separate cars or compartments for negroes has caused much friction and great expense; and for a much smaller class of persons the expense would be proportionately greater.

But expense and inconvenience do not constitute the main argument. If money and trouble were the only costs, the railroads might perhaps bear them. At all events, the Legislatures would have no hesitation in ordering them to do so. The question how to control the passengers would be the great difficulty. Who shall decide what passengers are sick? Having decided that a passenger should be put in the consumptives' car, how will you make him agree to be put there? Consumptives are proverbially unwilling or unable to believe that they really have the disease. Where should passengers be inspected? Before they enter the cars? If not the protection would be only partial.

There would seem to be no reasonable way to make even an attempt at a regulation of the kind proposed except by arranging with city or state boards of health. A health officer in regular attendance at every large station would seem to be a necessity. Whether or not the existing laws of the various states would warrant the forcible segregation of passengers who are afflicted with tuberculosis we do not know. Confining sick passengers to as few trains as possible, or to particular days of the week, would seem to be one of the most reasonable measures to adopt, but there would probably be constant objection to anything of the kind.

Now, we have rehearsed all these actual, probable and possible objections to the drummers' demands, not because we wish to kill the drummers (although at another time we may wish to take up this subject), nor to spread disease; not to show a false and harmful consideration for the feelings of the unfortunate, nor to save a little money; but because the present seems to be the proper time for the consideration of the difficulties in the case. And as a further element in the discussion, and one which has thus far had little if any expression, we append three interviews which we find in the *Philadelphia Times* of recent date:

Dr. Lawrence F. Flick, president of the Free Hospital for Consumptives, in speaking about the transmission of consumption in cars and the prevention of contamination from this source said:

"Some provision might be made against the spread of disease from sleeping car sputum, but a very good provision would be to cleanse and properly fumigate sleeping cars after they had been used. I think that is being done on some railroads. There is no reason why the linen and that part of a car which is likely to be contaminated should not be disinfected and properly cleansed each time they have been used.

"The fact is, for the implantation of tuberculosis a prolonged intimate exposure is necessary, and such exposure that could take place in a car—even a sleeping car—would be insufficient in the majority of cases to produce an implantation of the disease. This is made evident by the fact that although there are probably four or five intimate prolonged exposures for every case of tuberculosis in existence there is as a rule only about one new implantation for every old case.

"Now, if the intimate exposure to which those who are in constant contact with tuberculosis would only produce an implantation about one in five cases, it is not likely that a brief exposure of a single night in circumstances under which contamination cannot be very intense should frequently cause an implantation. Of course, if a person were much predisposed it is possible that an implantation could take place in such circumstances.

"I heartily indorse every movement which can shut out the possibility of implanting a single case of the disease, provided such movement does not inflict undue hardship on those so severely afflicted."

Dr. Thomas J. Mays said that the movement was conceived in a gross misconception of the nature of the tuberculosis germ and its contamination.

"The whole idea," said Dr. Mays, "is absurd and ridiculous. You might as well have separate compartments in street cars, separate pavements for the diseased to walk on and certain streets for them to live in. The idea is based on an assumption without a scientific basis. The proper thing to do is to first find out whether consumption is ever implanted from steam cars. So far as I know the disease has never been transmitted from the sick to the well in cars."

Dr. T. M. Tyson, head physician of the Rush Hospital for Consumptives, said:

"The movement in addition to being impracticable, as far as the railroads and the traveling public are concerned, is certainly not necessary. The danger from spreading consumption from this source is so far removed that the discussion hardly deserves the consideration of the physicians when so many other contaminated sources, more dangerous, are permitted to go unnoticed. Prolonged exposure to the germs is necessary and the exposure in the cars is of so brief a period as to be of practically no effect."

Weight and Capacity of Locomotives with Vanderbilt Boilers and Tenders.

There has been some unwritten discussion about the weight and capacity of locomotives having Vanderbilt boilers and tenders, compared with weight and capacity of locomotives as commonly designed. It has been said that the cylindrical designs impose greater weight for a given capacity, in both engine and tender.

Among numerous references to the Vanderbilt designs published in the *Railroad Gazette* some examples might be found that would tend to strengthen the foregoing opinion, but a conclusion thus drawn would be wrong when all the conditions thus far met in using these designs are considered. For example, a comparison of the standard New York Central mogul No. 1,753 with the New York Central-Vanderbilt mogul No. 1,766 shows that, while the total weight of the Vanderbilt locomotive is greater than that of the standard locomotive, the total weight of engine per square foot of heating surface is less for the Vanderbilt locomotive than for the standard. Some of the engines have been prepared for and sent into the most trying "hard water" districts, and there has been only one tender built.

It is at once apparent that an exact comparison is hard to make. To emphasize this it may be said that in tenders of general rectangular form with water legs extending forward, the dead weight for equaly carrying capacity varies as much as 1,500 lbs., according to the ideas of the designer, and proportionately greater variations may be found in locomotives of approximately equal steaming and tractive capacity.

The first Vanderbilt tender, for Illinois Central engine No. 64, illustrated in the *Railroad Gazette*, May 31, page 366, weighs practically the same as an Illinois Central tender of ordinary design for the same duty. That Illinois Central engine is somewhat heavier than other engines of the same class, but has more heating surface. Reference to the illustrations and description shows that while advantage was taken of experience in determining the weight of the engine, this first tender, in order to leave no question of durability, was made heavier in several respects than seemed really necessary. This applies to the thickness of the shell and to some of its reinforcements as well as to some of the framework of the tender. Experience has shown that some of these parts can safely be reduced in weight, that the general principle of building is correct and that the first estimate of a possible 15 per cent. saving in dead weight is reasonable, when the ordinary and the Vanderbilt tenders are both built as light as is consistent with strength. This has been fully established in designing the tender of the locomotive for the Plant System, to which we recently referred.

Of engines it may safely be said that for equal steaming capacity the Vanderbilt design need not be made heavier and may be made lighter than the ordinary design. This was shown in building the Buffalo, Rochester & Pittsburgh consolidation engine No. 250, which was illustrated and described in our issue of Sept. 13, page 631. We have compared drawings of that engine with those of an engine built as nearly as possible like it and of equal cylinder power, but having sloping grates in an ordinary wide fire-box above the frames. The weights, heating surface and cylinder dimensions of both engines are given herewith:

Comparison of Types.

	Vanderbilt engine.	Wide fire-box engine.
Cylinders	22 x 28 in.	22 x 28 in.
Heating surface, fire-box	135 sq. ft.	169 sq. ft.
Heating surface, tubes	2,450 sq. ft.	2,424 sq. ft.
Heating surface, total	2,585 sq. ft.	2,593 sq. ft.
Grate area	33 sq. ft.	35 to 46.5 sq. ft.
Weight on engine truck	17,700 lbs.	20,400 lbs.
Weight on drivers	151,900 lbs.	154,270 lbs.
Weight, total	169,600 lbs.	174,670 lbs.
Difference, grate area		(more) 2 to 13.5 sq. ft.
Difference, heating surface		(more) 8 sq. ft.
Difference, total weight		(more) 5,070 lbs.

From this it may be noted that while the heating surface of the wide fire-box engine exceeds that of the Vanderbilt engine by 8 sq. ft. the total weight of the wide fire-box engine is about 2½ tons greater than that of the Vanderbilt engine. The grate area, 46.5 sq. ft. in the wide fire-box engine, is 13.5 sq. ft. greater than in the Vanderbilt engine, but engines the same in all other respects have been built with 35 sq. ft. of grate area. The difference is therefore given as ranging from 2 to 13.5 sq. ft. more in the wide fire-box engine. From recent reports it is learned that the Buffalo, Rochester & Pittsburgh engine is doing quite as well as was expected of it.

The amount of grate surface required or obtainable bears vitally on the steaming capacity. It is plain that the available room for grates in the cylindrical fire-box is less than that in the rectangular fire-box when the diameter of the cylindrical fire-box is not greater than the width of the rectangular box at the fire line. The same would be true in regard to heating surface in the fire-box, within those restrictions, but thus far a circle 59 in. internal diameter has been taken as the size that can best be used and leave room to safely cover the crown with water, give enough steam room and grate area, and keep the grates at a suitable height. This diameter, it should be noted, does not represent a circle that could be inscribed in the average fire-box width, but may be regarded as a compromise between such a diameter and the diameter of a circle within which the clear cross width of the average rectangular fire-box could be inscribed as a square.

Since the general movement toward very wide fire-boxes in the last three years there has been but slight effort to further increase the efficiency of moderately wide fire-boxes. There are some exceptions to this rule, notable among which are some sub-divisions of the Class F moguls of the Pennsylvania Railroad, where a difference of more than 26 in. in width of the fire-box, and some differences in depth, are found, the engines of the two classes, F-3 and F-3-b, being otherwise the same. It is not hard to find those who believe that the wide fire-box idea has been somewhat overdone in trying to provide for extreme conditions of service, at the expense of economy in average duty; in short, that some of the largest engines partake too much of the coke-oven principle, distilling large amounts of gas that flames for a moment and is quickly extinguished and lost in the tubes; also requiring too much coal when the engine is side-tracked.

The idea is that enough of anything is plenty and that this is especially true of grate area in locomotives. This comment, of course, applies chiefly to soft coal burning and in the same way it is suggested that it is just as well to consider first how little grate area may be used, how the gases may be kept flaming longest, and how firing may be easiest done, rather than how much grate area can be provided regardless of the secondary stages of combustion. Putting in a very large amount of grate with the intention of shutting off part of it with dead-plates when the engine is assigned to less than maximum duty is not advisable. The dead-plate in a fire-box, either at front or back, is troublesome and usually it may be depended upon for several kinds of trouble, including warping or breaking, collecting ashes and mixing them with half-burned coal, making smoke, and letting air into the fire-box at the wrong time or place. It is a menace to the service because of its apparent simplicity and really great capacity for doing harm. Its simple appearance invites neglect and thus its worst extravagance is likely to be found in a heavy engine doing comparatively light work.

Our observation leads us to believe that when it is

desirable to reduce grate area the best way is to remove any number of grates that can be spared nearest to the flue sheet; build a low bridge wall of fire brick on the last remaining grate at the front and disconnect that grate from the shaker bar if it is a rocking finger grate; then enclose a deep space between the bridge wall and the flue sheet, as a pocket for sparks. This gives the benefit of long flameway with no accumulation of ashes in the fire-box proper. We have known an engine with 7 sq. ft. of dead-plate to bank five rows of flues solid with ashes in less than 100 miles of freight work, and the same engine, without changing the draft apparatus, worked without clogging when the dead-plates were out. When the flame is given a clear space between the forward edge of the burning coal and the flue sheet, and swirling sparks are trapped before entering the tubes there is a double advantage. Practically smokeless firing is possible and better results are obtained from the coal.

The idea we have here outlined was successfully used in the Johnstone experiments on the Mexican Central Railway in 1892. Mr. Johnstone used a cast-iron hopper in front of and below a high brick arch stepped up from the front edge of the grates and supported on the side sheets. The Santa Fe tests (*Railroad Gazette*, June 16, 1899, page 423) included the use of such a hopper, but it was larger than the Johnstone hopper and had only a plain vertical bridge wall 20 in. high at the front edge of the grates. This gave a clear flameway of 3 ft. from the coal to the flue sheet. The engine thus equipped worked about four months in heavy freight service before the simple pocket of ⅜-in. boiler steel, with a plain slide bottom, warped and burned out. In this case the total grate area was only 18.9 sq. ft., the engine was a four-cylinder tandem compound, equivalent to a 21 x 28-in. simple engine, and the fuel was soft coal, giving about 8 per cent. ash by analysis and about 16 per cent. ash by stationary boiler firing test. The boiler of this engine gave plenty of steam, even when the engine was working at full tractive force with 120 lbs. graduated high-pressure in the low-pressure cylinders and feedwater at 45 deg. F. was being fed at the rate of 2,800 gals, or more an hour. The evaporation was from 6 to somewhat over 7 lbs. of water per pound of coal, observed. This engine at first had 1,812 sq. ft. of heating surface and 29.2 sq. ft. of grate area, the ratio thus being about 62 to 1. The reduction of grate area to 18.9 sq. ft. made the ratio about 95 to 1. The working speed was usually not above 35 miles an hour and the heaviest demand was at speeds ranging from 6 to 20 miles an hour.

The Vanderbilt boiler embodies the principle considered. The combustion chamber as a feature of locomotive boilers has been thoroughly discussed and its difficulties are well understood, but its greatest advantage, long and unobstructed flameway, can be had by setting apart the forward end of the fire-box for this purpose as in the Vanderbilt boiler, or in some acceptable modification of the constructions we have previously mentioned. It would, therefore, seem that the general questions of grate area and pounds of coal burned per square foot of grate per hour, as applied to locomotives, largely resolve into the question of how used, rather than how much. Regarding the shape of fire-box it is quite generally conceded, from D. K. Clark to the latest man who has discussed the question, that to get the best evaporation it is well to delay the contact of flame with fire-box sheets as long as possible in the locomotive. Width for width, the cylindrical fire-box does this to a greater extent than the rectangular fire-box can.

September Accidents.

We publish in another column of this issue condensed records of the most prominent railroad accidents which occurred in the United States in the month of September. There are 46 collisions, 33 derailments and three other accidents. The accidents in this list which were the most serious or which are of special interest by reason of their causes or attending circumstances are the following:

11th, Wellington, Wash.
18th, Avon, Mass.
20th, Warren, Mass.
30th, Long Hill, Conn.

The only one of these four in which a passenger train was involved is that at Avon, where six passengers were killed. In this case the men in charge of the freight train appear to have been grossly negligent, and the railroad commissioners of Massachusetts lay the blame on the engineman and a brakeman who was attending to the switches. What these men intended to do was, after backing through a crossover to get out of the way of a following passenger train, to set up both of the switches of the crossover and then move a part of the train forward, but this forward movement was made after only one of the switches was set straight.

The collision at Long Hill was of somewhat unusual character. It appears that the conductor noticed the error of the engineman as soon as the train passed the station at which it should have stopped, but that he was unable, though assisted by the brakemen to the extent of their ability, to stop the train within the two miles which intervened between Stepney and Long Hill. This emphasizes the importance of concentrating on the locomotive, or at any rate on the front end of a train, as far as possible, the responsibility for avoiding danger ahead. The reports concerning the alleged weariness or sleepiness of the engineman in this case seem to have been given out by the coroner and to have been based on statements made by the engineman himself; there is, evidently, no doubt that sleepiness was the immediate cause of the runner's error; but at the same time it appears that he had had a fair length of time off duty. Whether or not he used this time for proper rest is not explained. Neither is there any explanation as to why the fireman did not check the engineman's error, or whether the fireman was a person of intelligence.

The collision at Warren occurred on a line equipped with automatic block signals. The switch which was set for a side track, and which was so connected with the automatic signal as to hold the signal against approaching trains while the side track was being used, was a long distance from the signal; so that a train might pass the signal after the switch was set and thus approach the danger point without receiving any warning except such as might be given by hand. The failure to give a hand signal is given as the immediate cause of this collision, but it looks as though negligence on the gravel train was an equally important element. This train was running with the engine at the rear and it seems that it probably passed the signal when the disk was in the stop or caution position; the engineman depended on the man or men at the front end of his train to read the signals, while the man or men at the front end left the duty to be attended to by the engineman. The reader will notice another collision in the present record which was due to neglect on the part of a person, other than an engineman, who was charged with the duty of looking out for danger ahead, but who did not do his full duty. From the care with which enginemen are selected to run special trains, where it is desired to make the best possible record, it is clear that most superintendents recognize the importance of training and experience in the position of lookout-man at the front end of a train; and yet we frequently hear of collisions due to the lack of these qualifications; to the fact that in some stress of circumstances which the officer in charge calls an emergency, a person deficient in either judgment or experience is appointed to pilot a train.

The disaster at Wellington, Wash., in which four persons were killed, belongs to a class which was prominent in last month's record, and which was there discussed. The derailment at Kenosha, Colo., on Sept. 23, appears to have been very much like that at Wellington.

Besides the four accidents above mentioned, eight others in the present record will be found of special interest by reason of their costliness or other peculiar features. These eight are the following: 2nd, Spring City Pa.; 8th, Jamestown, N. Dak., and Parker's Landing, Pa.; 9th, Glover's Gap, W. Va.; 11th, Whitewater, Kan.; 15th, Scottville, N. Y., and Eggleston, Minn.; 28th, Penn, N. Dak. It will be seen that five of these accidents were attended by fires or explosions, or both. The Jamestown collision, killing five employees, calls attention to the danger, in these days of heavy cars and quick stops, of running light cars in the front portion of long trains; and especially when it is necessary (?) to carry workmen on such cars.

The number of electric car accidents reported in the newspapers as having occurred in September is 19, in which three persons were killed and 36 injured. Two of these accidents were butting collisions, on electric railroads, of a passenger car with a freight car.

TECHNICAL.

Manufacturing and Business.

The Standard Pneumatic Tool Co., Chicago, has moved its office to Aurora, Ill.

The Standard Traction Brake Company, of 120 Liberty street, New York City, has recently received a large order for axle and motor-driven brake equipments for the Massachusetts Construction Company, 60 State street, Boston, Mass.

The Chicago Pneumatic Tool Company has made a license contract with Mr. J. G. Timolah, of 465 West Broadway, New York, for the manufacture and sale of portable drills under letters patent No. 369,120, issued to John Moffet, Aug. 30, 1887. Claims for past infringement have been discharged.

The Rodger Ballast Car Co., Chicago, has contracted to furnish the Atchison, Topeka & Santa Fe with 600 of its new 34-ft., 40-ton convertible ballast, gondola and coal cars, to be equipped with Westinghouse air-brakes, automatic couplers, American steel body and truck bolsters, Miner tandem draft rigging and McCord journal boxes; delivery to be in January, 1902.

M. J. Rogers, heretofore Master Mechanic of the Kansis City Belt Ry., has resigned in order to devote his entire time as President of the Rogers Metal Works, makers of Special Babbitt Metal, 1008 West Twenty-fourth street, Kansas City, Mo.

F. Mertsheimer has opened an office at 203 New York Life Building, Kansas City, Mo., where he will represent the Grant Tool Co., of Franklin, Pa., and J. S. Coffin, Franklin, Pa., maker of McLaughlin's flexible conduit for steam, air, water, oil or gas, and the economy oil cups. He will also handle the Mertsheimer & Edson ditching machine and slope leveler; also mine and mill supplies.

The Boston & Lockport Block Co. inform us that on Dec. 1 they will remove their Boston office and stock room from 142 Commercial street to 158 and 160 Commercial street, to better accommodate their increasing business. They will occupy five floors and the basement of that building.

Iron and Steel.

Wolff & Zwicker Iron Works and Shipbuilding plant in Portland, Ore., has been sold to Drake C. O'Reilly.

The Durham Iron Co., of Bucks County, Pa., was recently incorporated in that State, with a capital of $100,000.

The Bessemer Gas Engine Co., at Grove City, Pa., has begun work on a foundry to make brass and metal castings.

Edwin S. Cramp has been elected Vice-President of the Wm. Cramp & Sons Ship & Engine Building Co., succeeding his brother, the late Henry W. Cramp.

The Japanese Naval Department, according to report, is preparing to build a steel plate factory at Kure at a cost of about $3,000,000, to be finished in three years.

The Spearman furnace at Sharpsville, Pa., has been sold by the Spearman Iron Co., to the Shenango Furnace Co., of Pittsburgh, and possession will be taken on Jan. 1.

The George H. Smith Steel Casting Co. has bought the Milwaukee Steel Casting Co., of Milwaukee, Wis. A 100-ft. addition has been made which about doubles the capacity of the works.

The Lane Bridge Co., of Painted Post, was incorporated in New York State Nov. 11, with a capital stock of $50,000, by D. F. Lane, A. E. Lane and C. W. Smith, all of Painted Post, N. Y.

The Ashland Iron & Steel Co. filed articles of association in the State of Wisconsin recently, with a capital stock of $900,000. It is said that a plant will be built in Ashland, Wis. W. H. Hinkle, of that city, is the Secretary.

All the mills of the United States Steel Corporation, as well as many of the independent plants, are reported to have broken all previous records for production of steel during the month of October.

The Phoenix Bridge & Iron Co. is building a Canadian plant at the corner of Wellington and Shannon streets, in Montreal, Que. The buildings, which are of steel framework, are being put up by the company and will be finished in May.

The Jupiter Steel & Coal Co. has been incorporated under the laws of West Virginia, with a capital of $1,000,000. A plant is about finished near Carnegie, Pa. Another plant will soon be built at Beaumont, Texas. The company will use the patents of the United States Steel Co., of Boston, operating a plant at Everett, Mass.

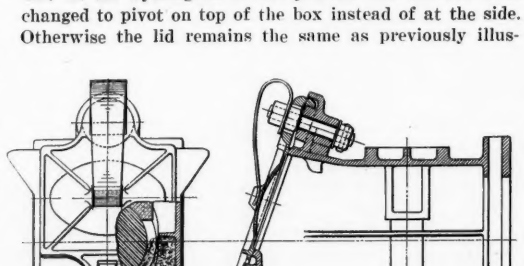
The Baltimore & Ohio's contract for 55,000 tons of rails is said to be divided as follows: U. S. Steel Corporation, 30,000 tons; Maryland Steel Co., 15,000 tons, and the Cambria Steel Co., 10,000 tons. Of the Maryland Steel Co.'s allotment, 11,000 tons will be 100-lb. rail. The rest will be 85-lb.

The Secretary of War has approved estimates for work at the Puget Sound Navy Yard, amounting to about a million and a half, for buildings and machinery.

Rear-Admiral R. B. Bradford, Chief of the Bureau of Equipment, Navy Department, recommends in his annual report that two large steam 10,000-ton colliers be built to keep coal deposits supplied in time of peace, and to accompany fleets in time of war. Plans have been prepared and bids are about being asked for a coal storage plant at the Washington Navy Yard to cost $40,000. During the last fiscal year the navy used 342,108 tons of coal, for which $2,273,111 was spent. Ten years ago the navy used 73,000 tons of coal a year.

An Improved Journal Box Lid.

The T. H. Symington & Co. journal box lid has been changed to pivot on top of the box instead of at the side. Otherwise the lid remains the same as previously illustrated.



The changes are shown in the accompanying illustrations. The lug at the bottom of the box, holding the lid central when closed, is slightly tapered on the sides, so that in a side blow the lid will swing open freely. No weight comes on the pivot bolt, the weight of the lid being entirely supported by the solid lugs on the box and lid itself. The nut forming the head of the pivot bolt is riveted on with a ¼-in. rivet, and the bolt cannot be removed without cutting out the rivet. This lid will be their standard in future.

The Lake Como (Ganz) Electric Road.

The electrical equipment of the long railroad on the east bank of Lake Como (Ganz system) was so far completed that trial trips were made between Oct. 5 and 7. The road was to be opened for traffic Nov. 4.

A Valuable Property of Protectus Paint.

The makers of the paint known as "Protectus" claim for it a property which has a special value in the treatment of iron and steel surfaces. It appears from actual experiment that the Protectus gets through the mill scale

and loosens it so that it is easily flaked off. This phenomenon has appeared in the way of blisters on surfaces painted with Protectus. Tests have been made with the vehicle of this paint, without the pigment, on the inside of coal cars which show that a car can be cleaned quicker and cheaper by first giving it a coat of the vehicle than by scraping it. After it is so cleaned the metal surface can be painted, with certainty that it is protected from further rusting.

M. C. B. Association.

Railroad men and draft gear makers are invited to attend an open meeting to discuss plans for M. C. B. draft gear tests. This meeting will be held at the Auditorium Hotel, Chicago, Wednesday morning, Nov. 20. An outline of the plan proposed by the M. C. B. draft gear committee was published in our issue of Nov. 8.

New East River Bridge Cables.

Mr. William Hillenbrandt, Chief Engineer for the Roebling Son's Co., lately said: "We are behind in our cable contract, but it must be understood that it takes time to build such a stupendous structure. Many people do not stop to consider that the weather at times interferes greatly with our work. For two weeks we have vainly tried to run a guide wire for the cable. High winds were in the main responsible for the failure. The 500 tons of cable wire now in our shop here are spooled and ready to be stretched across the river. There is a possibility of the work being begun before the close of the week. The strike in the Trenton shop in no wise interfered with us. When once we get the work started much of the lost time will be made up."

The Isthmian Canal.

The Isthmian Canal Commission met in Washington on Tuesday of this week in what is believed to have been its final session. Probably the complete report will be handed in at once and we may hope shortly to know what it is.

A Ten-Coupled Engine.

The Semmering Railroad for some 18 months past has been experimenting with a 10-wheeled locomotive with all wheels coupled; the first, third and fifth axles having a lateral motion to enable the engine to pass the curves. The experience has been so favorable that 15 more such engines have been ordered. Von Borries has inspected the working of this locomotive for the Prussian Minister of Public Works, and the latter calls the attention of his subordinates to it and suggests that it may be preferable to certain types of powerful engines now in use on the Prussian State Railroads.

British Westinghouse Electric & Manufacturing Co.

The British Westinghouse Electric & Mfg. Co. is shortly to issue £250,000 of preferred shares to provide funds for finishing the new plant at Manchester. In addition to the contracts for this plant, which have recently been mentioned, a contract is let to the American Gas Furnace Co., of Elizabeth, N. J., for 13 special gas blast furnaces.

A New Steel Plate Combination.

It is reported that a company with a capital of about $50,000,000 will soon be incorporated in New Jersey to unite many plate mills of the country, and it is said that 10 or more plants in Pennsylvania are to be absorbed. Chas. M. Schwab, President of the United States Steel Corporation, is said to be at the head of the new company, which has already secured control of the Tidewater Steel Co., the Lukens Iron Co. and the Central Iron & Steel Co. also the Worth Bros.' mills.

The Algiers (La.) Floating Dock.

The Navy Department has been informed of the safe arrival at Algiers, La., on Nov. 5, of the floating steel dry dock, which was towed down from Baltimore, leaving there Oct. 15. The battleship "Illinois" will be sent down soon to test the dock. The Maryland Steel Co. built the dock and agreed to deliver it at Algiers, to which place it was towed by steamer.

Rogers Locomotive Works.

Announcement is made that Messrs. Elliott C. Smith and Frank P. Holran, who recently bought the plant and property of the Rogers Locomotive Company, have completed the organization of the new corporation called the Rogers Locomotive Works. The permanent officers of the new corporation are: John Havron, President; E. Hope Norton, Vice-President; Frank P. Holran, Treasurer; George E. Hannah, Secretary; Reuben Wells, General Manager, and John W. Griggs, General Counsel. The directors are: Sir William C. Van Horne, George B. Hopkins, George Turnure, J. D. Probst, Elliott C. Smith, Frank P. Holran, John W. Griggs, Robert C. Pruyn, E. Hope Norton, John Havron and Stephen Peabody. The Executive Committee is composed of John Havron, President, ex-officio, and George B. Hopkins, J. D. Probst, Elliott C. Smith, Robert C. Pruyn and Stephen Peabody.

THE SCRAP HEAP.

Notes.

The Nashville, Chattanooga & St. Louis has discontinued the pay train, and will hereafter pay employees by check.

The General Superintendent of the Delaware, Lackawanna & Western has notified station agents that after this year the compensation of agents will be graduated according to the earnings of the road at their respective stations.

The Chicago, Burlington & Quincy now runs two fast mail trains each way daily between Chicago and Council Bluffs. The westbound trains, leaving Chicago at 3 a.m. and 9:30 p.m., run through in 11½ hours and 10½ hours respectively. The eastbound trains, leaving Council Bluffs at 4 p.m. and 8:05 p.m., run through in 10 hours and 20 minutes, and 11 hours, respectively. The distance is 500 miles.

At Deming, N. Mex., one day last week, a body of armed men, employees of the Bisbee, El Paso & Southwestern Railroad, took forcible possession of a switching engine of the Southern Pacific and transferred to their own line 90 loaded freight cars which the Southern Pacific had refused to deliver except on payment of a switching charge of $5 for each car. To prevent further violence the Southern Pacific tore up a piece of track.

The *Official Guide* for November did not appear until the 11th; but it contains in nearly complete form the extensive changes in time which were made throughout the country on Sunday, Nov. 3. The principal features of the changes on the Southern Pacific, the Oregon Railroad & Navigation Company, the Denver & Rio Grande, and other far western roads, were sent to the *Guide* by telegraph. Some companies were able to furnish written abstracts in advance; and one road, the Atchison, sent complete time-tables for its whole system on the 23rd of October.

The Pennsylvania Railroad has appropriated $35,000 for a building for the Young Men's Christian Association at Pitcairn, Pa. Pitcairn is the large freight terminal a few miles east of Pittsburgh. The Association there has been established 18 years. The Wabash road has appropriated $6,000 for a building for the Young Men's Christian Association, at Peru, Ind. Miss Helen Gould, of New York, gives $2,500 toward this building. The Boston & Maine has just established a building for the Young Men's Christian Association at East Deerfield, Mass., costing $2,500.

Traffic Notes.

The Car Service Association, of Memphis, has reduced the free time for cars of coal from five days to three days.

At the principal cities on the New York, New Haven & Hartford, passengers going to New York can now get their baggage checked direct to any residence or hotel in New York or Brooklyn.

The Corporation Commission of North Carolina has issued an order reducing freight rates on all divisions of the Seaboard Air Line. It is said that the reductions in rates on lumber and on cotton mill products exceed 20 per cent.

The daily newspapers report the passenger men as saying that during the last few weeks of the Pan-American Exposition, at Buffalo, more than 500 passengers leaving that city were made to pay cash fares in consequence of their having tickets which had been manipulated by scalpers.

The Corporation Commission of North Carolina has ordered the application of the standard passenger rates to all branch lines on the Atlantic Coast Line. This order amounts to a reduction of about 2½ mills a mile on these branch lines, and the Commission requires it to be put into effect at once.

The very low ocean rates now prevailing, in consequence chiefly of the falling off in grain shipments, have resulted in considerable shipments of anthracite coal to Europe. The agent of the Philadelphia & Reading says that he now has about 11,000 tons afloat for Germany. The vessels carry coal to Germany from $1.85 to $2.60 a ton.

The McCaull-Webster Grain Company, operating elevators in Iowa and Nebraska, has begun suit to compel the Chicago, Milwaukee & St. Paul to give shipments of grain destined to Southern points for export the same privileges enjoyed by shipments going by the way of Chicago and New York. The grain company claims that rates via Chicago to New York have been made prohibitive by Eastern trunk lines, and that the Milwaukee road is discriminating against the grain company in the way of switching and furnishing cars to carry grain beyond its lines to the Gulf seaboard by way of Omaha.

The Railroad Commissioners of Massachusetts, acting on a complaint of P. M. Burns and other shippers, hold that when goods (boxboards) are shipped to a certain station because facilities are deficient at another station, nearby, the latter being the normal place of delivery, the extra cost should not be charged to the shipper.

The goods started from East Freetown and Myricks. The nearest railroad point upon the seaboard is New Bedford, and boxboards were formerly shipped from these places by direct route over the Old Colony Railroad, to that point, at a rate of 4 cents per 100 lbs. Owing to lack of facilities in New Bedford for the re-shipment of these boards by vessel, the company changed the point of destination to Fairhaven (the other side of the harbor), which was reached by way of Middleboro and Tremont, a considerably longer route. No change was made in the rate until January, 1900, when the New York, New Haven & Hartford, operating the Old Colony road under lease, advanced the rate from 4 cents to 6 cents. The decision says: The advance in rate is defended on the ground of the expense to the company of the longer haul to Fairhaven. In effect the claim is that a company which has a direct and an indirect route of transportation to a given point, may decline to provide convenient facilities in connection with its direct route, and compel shippers to pay the extra expense of the longer and circuitous route. This places the burden in the wrong place, and is an unreasonable rule of business. Moreover, the advance in rate imposes upon these shippers a tax which makes it difficult for them to compete in the market with dealers from other localities. The Old Colony, apparently looking at the matter in this light, when it made the change in route left the rate untouched. As we believe that the advance in rate of which the petitioners complain was not justified under the circumstances, we recommend that the old rate be restored.

Changes in the Grain Trade.

Trade relations are constantly changing; but probably no divergence from the old to the new is so marked as on the several Produce Exchanges and Boards of Trade throughout the country. This may seem inconsistent in view of the growing importance of the export business in all foodstuffs, breadstuffs, and provisions; but the change is in method. Formerly, the West was wholly dependent financially on the East for moving the crops. The seaboard markets, and principally New York, were the "clearing house" for the export business of all grain, flour, feedstuffs, provisions, etc., and also for the general distribution to all Eastern and Southern ports. These trade relations no longer exist. The producer and consumer coming closer together have crushed out the middlemen. The large flour mills at the West now transact their export business direct. The grain exporter is being dispensed with, his occupation almost gone, in the forced competition with the grain elevator interests extending farther and farther West until now Chicago may be termed an Eastern point. There has been a feeling that speculation would always hold its own or increase, but speculation in grain and provisions to-day is comparatively a small thing. The old-time roar and rush of mighty opposing speculative forces are of the past. New York Produce Exchange memberships that were held with confidence at $5,000 and seemingly reasonably predicted to be worth $10,000 or more, are now about $250. To facilitate and induce outside speculation, commission charges have been cut in half. Exporters are doing business at from ⅛ to $^1/_{10}$ former charges. All primary grain markets are in like conditions.—*Evening Post*, New York.

I. C. C. Hearings.

The Interstate Commerce Commission took evidence in Chicago last week on the complaint of the National Hay Association regarding freight rates to the East. On Jan. 1, 1900, hay was advanced from sixth class to fifth class, which made an increase of $1 a ton from Chicago to New York and New England. The shippers say that this has shut out western hay from the eastern market; New York and New England now get their hay from Canada. C. S. Bash, of Fort Wayne, Ind., formerly shipped 250 cars a year to the East; now he ships none. Mr. Bash also ships grain, and being asked by Chairman Knapp if tariff rates were maintained, said:

"Always on hay; very rarely on grain."

"How do you know that?"

"The firms to whom I ship grain always instruct me to ship by a certain route. If I ship by any other road I get just one cent less per bushel for the grain. I have letters from those firms saying that the roads they designate are paying them rebates. Some direct me to ship only by the Pennsylvania road, others by the Baltimore & Ohio."

This testimony raised a storm of objections from the attorneys for the railroads. "He only knows what somebody has written him about rebates; he has no personal knowledge," they declared.

"Well, I will give the commission those letters and they can compel the writers to testify," replied Mr. Bash.

"What proportion of grain is shipped at cut rates?" asked Commissioner Fifer.

"All of it," promptly replied Mr. Bash. "No man could deal in grain if he had to pay higher freight rates than his competitors."

"Do you think rates are cut from Chicago as well as from Fort Wayne?"

"Although the published grain rate from Fort Wayne to New York is only 90 per cent. of the Chicago-New York rate, Chicago dealers get a higher price for the same grade of grain than we do in Fort Wayne and the grain is delivered in the East cheaper from Chicago than from Fort Wayne. In other words, rates are cut worse from Chicago than in Fort Wayne."

On November 8, the Commission heard the testimony of Messrs. Grammer, of the Lake Shore; Biddle, of the Atchison, and Hudson, of the Illinois Central, concerning rates on grain, flour and feed to the Atlantic seaboard and to the Gulf of Mexico. The principal witness was Mr. Grammer, and his recital of the conditions of affairs relative to grain eastbound aroused deep interest. He admitted that the export rates on grain and grain products were constantly cut, that the tariffs were seldom maintained, that the export rates were always secret, that little grain had been moving as domestic grain and that an Association existed the members of which met at regular periods and, in violation of the Anti-trust law, agreed upon rates and percentages and kept a record of the same.

When asked why the roads did not publish their export rates the same as domestic rates, he replied that if they did the press of the country would charge that the railroads were favoring foreign countries and foreign markets at the expense of the home markets and home producers.

Mr. Grammer believed that not a miller in the country paid full tariff rates on flour; he declared the flour rate to the seaboard was from one to two and a half cents higher than the grain rate. He denied that rate discrimination was driving certain millers out of business.

Mr. Biddle admitted that rates on export grain to the seaboard had not been maintained and that a large percentage of the grain moved was moved as export grain.

Mr. Hudson and several prominent millowners testified regarding the discrepancy between grain and flour rates.

It transpired during the investigation that the Commission is interested in the preparation of a measure which is to be a modification of the Cullom bill, and which will be introduced at the next session of Congress.

It was also asserted that the result of the evidence taken by the Commission here and in New York city will be given to Congress in the form of a report and petition for the remedial legislation sought.

On Monday of this week Commissioners Prouty and Fifer held a hearing at Denver concerning rates from the Pacific Coast to that city. It appears that the railroads did not obey the order issued by the Commission a year ago concerning these rates.

Technical Schools.

Massachusetts Institute of Technology.—Within a short time the students will be asked to choose from a number of designs, one to be adopted as the official technology flag. Up to the present time the Institute has possessed no such official emblem. When President Pritchett went to the bi-centennial exercises of Yale College it was requested that he take with him the Institute flag, and fly it from his quarters in New Haven, but he couldn't, for there was none.

Bad Water Makes Trouble.

Speaking of freight congestion on railroads entering Pittsburgh, an official of the Pittsburgh & Lake Erie is thus quoted: "The rivers hereabouts are responsible. On account of the absence of rain the water is filled with acid and filth to such an extent that it is impossible to use it in our engines. We are obliged to haul water to the various tanks along the line, especially in the up-river

regions, where the water is positively unfit for use. The presence of acid is a great menace to the operation of our trains. The acids eat through the boilers of the engines and by the use of river water much of our motive power has been cut off. We have now several of the heaviest engines in the shops on this account." It is also said that the Baltimore & Ohio is hauling water from the mountains and the lower river, after finding the water in the Monongahela and Youghiogheny rivers unfit for use in locomotives. The Pennsylvania has similar trouble.

LOCOMOTIVE BUILDING.

The Coahuila & Pacific has ordered four consolidation engines from the Baldwin Locomotive Works.

The Maine Central has ordered from the Manchester Locomotive Works four engines.

The Detroit & Mackinac has ordered two engines from the Baldwin Locomotive Works.

The Shreveport & Red River Valley has ordered one engine from the Baldwin Locomotive Works.

The Cincinnati, New Orleans & Texas Pacific has ordered 10 consolidation engines from the Baldwin Locomotive Works.

The Northern Pacific has ordered 50 locomotives from the Baldwin Locomotive Works, and is considering placing some further orders.

The Erie has ordered 15 consolidation engines from the Rogers Locomotive Works, and is considering placing contracts with other builders.

The Delaware, Lackawanna & Western has ordered 10 four-wheel switching engines from the American Locomotive Co. They will be built at the Schenectady works.

The Long Island has ordered two engines of the Atlantic type, with 19-in. x 26-in. cylinders and 76-in. drivers; eight 10-wheelers with 20-in. x 26-in. cylinders and 72-in. drivers; and two switching engines. The name of the builders has not yet been given out.

CAR BUILDING.

The Denver & Rio Grande has asked prices on 15 coaches.

The Union Tank Line has ordered 18 freight cars from the Pressed Steel Car Co.

The Plant System has ordered three parlor cars from Harlan & Hollingsworth.

The Costa Rica is having 20 freight cars built by a firm in Bristol, England.

The Vandalia has ordered five caboose cars from the American Car & Foundry Co.

Armour & Co. have ordered 200 refrigerator cars from the American Car & Foundry Co.

The Anglo-American Refrigerator Car Co. is in the market for 100 refrigerator cars.

The Union Pacific is reported to have ordered 70 passenger cars from the Pullman Co.

The Louisville & Nashville, it is reported, has ordered eight chair cars from the Pullman Co.

The Georgia Southern & Florida has ordered seven coaches from the Barney & Smith Car Co..

The Florida & East Coast has ordered two additional postal cars of the American Car & Foundry Co.

The Atchison, Topeka & Santa Fe has ordered 600 ballast cars from the American Car & Foundry Co.

The Wiscasset, Waterville & Farmington has ordered two passenger coaches from the American Car & Foundry Co.

Williams Bros. have ordered one freight car from the American Car & Foundry Co., to be built at West Detroit.

The Louisiana & Northwest has ordered 30 freight cars from the American Car & Foundry Co., to be built at St. Louis.

The American Car & Foundry Co. has orders from individual concerns for 100 tank car bodies, 10 logging cars and one tank car.

The Colorado Springs & Cripple Creek District has ordered six observation cars and four coaches from the Barney & Smith Car Co.

The Lake Shore & Michigan Southern has ordered two freight cars from the American Car & Foundry Co., to be built at Huntington.

The Georgia, Florida & Alabama has ordered 20 freight cars from the American Car & Foundry Co. They will be built at the Jeffersonville shops.

The Newaygo Portland Cement Co., Newaygo, Mich., has ordered three freight cars from the American Car & Foundry Co. They will be built at West Detroit.

The Pennsylvania has ordered 32 passenger and 400 refrigerator cars from the American Car & Foundry Co. It is reported that 3,000 40-ton box cars have also been ordered from the American Car & Foundry Co.

The Long Island has ordered 10 parlor cars, 12 vestibule coaches Class Pk, 20 coaches (not vestibuled) Class Pk, three O K vestibule combination cars, four O K combination cars (not vestibuled), two baggage and mail cars and 10 60-ft. baggage and express cars. Further particulars are not available at present.

The Pennsylvania has asked bids on the following cars: Five thousand Class G L selfclearing steel gondolas; 4,000 plain gondolas, 40 ft. long, 30-in. sides, 100,000 lbs. capacity, with metal underframes and sides and floor of wood; 1,000 gondolas, 40 ft. long, 45 in. sides, 100,000 lbs. capacity, with metal underframes, sides and floor; 1,000 Class X L box cars of the standard dimensions recommended by the American Railway Association, 100,000 lbs. capacity, with metal underframes; 500 flat cars, 40 ft. long, 100,000 lbs. capacity, metal underframes and wooden floors; and 500 refrigerator cars. These are in addition to the 2,000 Class X L box cars ordered recently, making 14,000 cars in all.

BRIDGE BUILDING.

ARCADIA, IND.—The County Board is considering a bridge over Hinkie Creek, at the Burgess and Grim crossing.

BOSTON, MASS.—Bids are wanted, Nov. 20, by B. T. Wheeler, Superintendent of Streets, for a bridge on Brooks street; also for a bridge on Bennington street.

BROCKTON, MASS.—The Board of Aldermen has passed an order authorizing improvements to be made to Ames street bridge which will cost about $10,000.

BROOKLYN, N. Y.—The Robert Gair Mfg. Co. will build a steel bridge over Washington street, connecting its factories, at a cost of $10,000.

BROWNSVILLE, TEXAS.—It is reported that a bridge will be built over the Rio Grande at this place, to connect the city with Matamoros, Mexico, replacing the ferry.

CHICAGO, ILL.—The Drainage Board is reported to have had new plans made for the bridge over the Chicago River at Harrison street. It was at first proposed to have a 140-ft. Scherzer rolling liftbridge. The new plans were made by the Hall Bascule Bridge Co.

CINCINNATI, OHIO.—Bids are wanted, Nov. 30, for a bridge over Miami & Erie Canal. Robert Allison, President, Board of Public Works.

CLEVELAND, OHIO.—The contract for rebuilding the Canal street bridge has been let to the King Bridge Co., of Cleveland.

CORNING, N. Y.—A steel bridge will be built over Canisteo River at a probable cost of $5,000.

DAVENPORT, IOWA.—The Council is considering a bridge on Bell avenue at the Jersey Ridge road.

DEL RIO, TEXAS.—The St. Louis & San Francisco will probably build a bridge over the Rio Grande at this place.

DENVER, COLO.—The City Council is reported to have decided to build a bridge over Platte River at Bayard street.

DES MOINES, IOWA.—We stated last week that bids would be wanted, on Dec. 14, for two bridges. One of these bridges will be a steel highway structure over Des Moines River from the south end of East Sixth street. It will be 703 ft. long, 21 ft. wide between trusses, with two 6-ft. sidewalks. The other bridge is a Melan arch highway structure over Des Moines River at North Sixth avenue. The plans will be on file in the office of the City Engineer and the Board of Public Works after Dec. 1. G. A. Eberhart and J. E. Stout, Members of the Board.

DUARTE, CAL.—The Los Angeles County Supervisors are considering building a highway bridge over the river east of this place at a cost of $20,000.

EL PASO, TEXAS.—The Mexican Government is reported to have granted a concession for a bridge across the Rio Grande connecting Juarez, Mexico, with El Paso, Texas, to Pedro M. Armendariz, of Juarez, who also will build an electric railroad. The bridge is to be finished within two years.

ECUADOR.—According to report in a local paper, the Guayaquil & Quito R. R., of Ecuador, South America, will probably place contracts for bridges in Europe, several contracts having already been placed with the Patent Shaft & Axle Co.

FAIRBURY, NEB.—W. J. Diller, County Clerk, will receive bids until noon of Dec. 5, for all wooden and steel bridges needed by Jefferson County for the year beginning Jan. 1, 1901.

FAIRFIELD, ILL.—The Board of Supervisors has voted in favor of building two bridges, one west of Golden Gate and another south of that place.

FREDERICK, MD.—The Frederick County Commissioners have decided to build a steel bridge over Monocacy River at Crist's Ford, between Urbana and Buckeystown districts. It will be about 300 ft. long.

GUILFORD, N. Y.—The State Railroad Commission has ordered an underground crossing of the New York, Ontario & Western on Old Road at Delevan's crossing.

INDIANAPOLIS, IND.—Mr. James Nelson has been appointed City Engineer of Indianapolis, succeeding Mr. B. J. T. Jeup, recently resigned to enter private business.

IRELAND.—Bids will be received, until Dec. 16, for a single track railroad viaduct for the Fishguard & Rosslare Railways & Harbors Co., across the River Barrow, in South of Ireland. There will be 13 fixed spans of 140 ft. each, and two opening spans of 80 ft. each. Plans, etc., may be had of Sir Benjamin Baker, 2 Queen's Square Place, Queen Anne's Mansions, Westminster.

IRON MOUNTAIN, MICH.—Regarding the numerous reports that the Dickinson County Board had recommended two bridges over Menominee River, we are told that the Board is considering one bridge, but has not yet decided to build. R. C. Browning, County Clerk.

JANESVILLE, WIS.—We are told that a bridge is proposed over Rock River at Milwaukee street to consist of two spans, but the work is not yet authorized. C. V. Reich, City Engineer.

JASPER, GA.—Bids are wanted, Nov. 16, for a 100-ft. bridge over Talona Creek. C. J. Cornelison, Ordinary.

KANSAS CITY, MO.—The bids received Nov. 6 for building the Benton Boulevard bridge over the Belt Line tracks are: Foundation: Parker-Washington Co., concrete work, $6.98 per cu. yd.; earth excavation, 75 cents per cu. yd. Midland Construction Co., concrete work, $7.59; earth excavation, $2 per cu. yd. For the superstructure: Midland Construction Co., $17,389; A. M. Blodgett, $15,990; Wabash Bridge & Iron Co., $18,000; American Bridge Co., $15,435; Waukesha Modern Steel Structural Co., $14,842.

KEYSER, W. VA.—A steel bridge is proposed over the Potomac River connecting Keyser with Westernport, Md. The counties in which these cities are located are interested.

LANCASTER, PA.—Regarding the report that the Conestoga Traction Co. is interested in the project to build a bridge over the Susquehanna River connecting York and Lancaster counties, we are told that the project has not yet taken any formal shape.

LEXINGTON, KY.—A committee has been appointed by the County Court to consider the proposed crossing of the Cincinnati Southern by the Georgetown & Lexington Interurban R. R., about six miles from Lexington. A bridge will be built at the crossing.

LOCKLAND, OHIO.—A bridge to cost about $10,000, is said, will be built at Benson street.

MANKATO, MINN.—According to report, a pontoon bridge is under consideration across the Minnesota River to the Nicollet County side at a point south of Jackson street.

MARIETTA, OHIO.—We are told that the contract for the steel work on the Ohio River Bridge & Ferry Company's structure to cross the Ohio River, will soon be let. C. L. Strobel, 1744 Monadnock Block, Chicago, Ill., is the Engineer. There will be one span of 650 ft., and one span of 600 ft., and several smaller spans, making the bridge a total length of 1,820 ft.

MARQUETTE, MICH.—The County Board has made an appropriation for a steel bridge which will be built over Carp River on the road to Sands.

MAXTOWN, OHIO.—Bids are wanted, Nov. 25, for a steel bridge over Big Walnut Creek. Frank Warren, County Auditor.

MILWAUKEE, WIS.—Chas. J. Poetsch, City Engineer, informs us that there are three viaducts proposed over Menomonee Valley. One on Washington street will be about 2,800 ft. long and cost about $300,000. The other two viaducts will cross First street and Racine street. No definite conclusion has been reached as to the latter two. Plans are being made and bids will probably be wanted this season for the bridge at Washington avenue.

NEWBURYPORT, MASS.—The Government Engineer for this district has recently considered the site for the new bridge over Merrimac River, as decided upon by the County Commissioners. (Construction Supplement, Oct. 11, 1901.)

NEW LONDON, CONN.—Reports state that in anticipation of the War Department's disapproval of the plans of the Central Vermont Ry. for a drawless bridge over Winthrop Cove, that company is having plans made for a bridge with a draw span.

OMAHA, NEB.—See Wabash, under Railroad Construction.

PORTLAND, ME.—A new bridge is proposed over the Boston & Maine tracks at "Skunk's Hill." The Portland (Street) Railroad is interested.

PITTSBURGH, PA.—Reports state that plans have been made and bids will be wanted this week for building the Panhandle bridge over Monongahela River at Try street. The work will cost about $200,000.

The Finance Committee of the Councils has recommended an ordinance for a new bridge on Center avenue over the Pennsylvania R. R. tracks, at a cost of $13,000.

PRESIDIO DEL NORTE, TEXAS.—A bridge will probably be built over the Rio Grande at this place by the Kansas City, Mexico & Orient Ry.

PROVIDENCE, R. I.—It is said that the Committee on Highways will recommend legislation at the November session, for the proposed bridge over the Woonasquatucket River at Chatlett street. This project has been before the City Council for two or three years.

SACO, ME.—The Railroad Commissioners are considering building a bridge over the railroad tracks at this place.

SANATOGA, PA.—According to report, the Commissioners of Montgomery County and Chester County are considering building an inter-county bridge across the Schuylkill River at Heister's Ford, a short distance below Sanatoga station. Viewers have been appointed by both counties to consider the site.

TORONTO, ONT.—The City Engineer reports that a footbridge over the railroad tracks at Lansdowne avenue, as petitioned for, would cost $4,500.

VICTORIA, B. C.—Bids are wanted by W. S. Gore, Deputy Commissioner of Lands and Works, until Jan. 8, for the Fraser River Bridge, as stated in our advertising columns.

WELLSBURG, OHIO.—The Pittsburgh, Carnegie & Western (Wabash R. R.), in addition to the bridge to be built over the Monongahela River which was recently awarded, will need a 700-ft. bridge over the Ohio River near Wellsburg, Ohio, and four or five viaducts on the road between this place and Pittsburgh. Messrs. Boller & Hodge, New York, are the engineers for bridges and viaducts; J. W. Patterson, Pittsburgh, Pa., is Engineer for the railroad.

ZANESVILLE, OHIO.—All the contracts are let for the Y bridge over the Lateral Canal of Muskingum River. The Massillon Bridge Co. will build the superstructure, and F. M. Townsend, of Zanesville, the substructure.

Other Structures.

ALIQUIPPA, PA.—Chas. T. Schoen and E. A. Schoen, formerly of the Pressed Steel Car Co., who are organizing a company to make rolled steel car wheels, will build a plant near Aliquippa, Beaver County.

ASHLAND, KY.—The Ashland Sheet Mill Co. is building a continuous billet heating furnace of 130 tons of 4 x 8-in. billets every 24 hours.

BINGHAMTON, N. Y.—See Salamanca, N. Y.

BIRMINGHAM, ALA.—Contracts are being let at Birmingham by Don H. Bacon for improvements at the Ensley steel plant of the Tennessee Coal, Iron & Railroad Co. Four 50-ton open-hearth steel furnaces and a hoop, tie and bar mill with a daily capacity of 300 tons, will be added to the works. (Aug. 16, p. 581.)

BLOOMFIELD, N. J.—The Lackawanna R. R. will build a new station in Bloomfield at Arlington avenue. This company has recently completed several new stations on its lines and reports are that others are to be built.

BUFFALO, N. Y.—Extensive improvements for increasing the lake terminal facilities of the New York Central & Hudson River Railroad and its lake line, the Western Transit Co., are reported planned, to be finished before the opening of navigation in 1902.

CINCINNATI, OHIO.—The freight shed of the Louisville & Nashville and the freight house of the Chesapeake & Ohio at Third and Ross streets, with a number of freight cars, were burned on Nov. 10. The loss is said to be $100,000.

DES MOINES, IOWA.—The Des Moines Bridge & Iron Works is improving its plant at Des Moines by putting up new buildings and placing new cranes in the old shops.

DUNBAR, PA.—The Dunbar Furnace Co. will build a new stack here next summer and the Sement-Solvay Co., which is supplying the furnace company with fuel, will build 60 more by-product coke furnaces at once.

FORT WILLIAM, MAN.—The Canadian Pacific is considering enlarging the coal facilities at Fort William. The capacity there now is about 200,000 tons and this will be increased by about 50,000 tons. A new flour and freight shed is also being considered.

GREENVILLE, PA.—The Bessemer & Lake Erie proposes to build new shops at Greenville, but the plans have not progressed far enough to give definite information.

HARRISBURG, PA.—Regarding the reports that the new passenger station of the Reading in Harrisburg is about to be awarded, an officer writes that the company has not decided on the plans for the station and probably will not let the contract before next spring, as a great deal of preliminary work must be done. The old station has been sold to the Pennsylvania R. R., who will remove it, and a subway will be built under the tracks of both companies. The new station will be on the south side of Market street. The present structure is on the north side of that street. Alexander F. Smith, of Reading, is the architect. A freight station will be built before the passenger station.

KENTON, OHIO.—The Champion Iron Works, according to report, is looking for a new site to which to remove its plant.

LIMA, OHIO.—We are informed that the Lima Locomotive & Machine Co. proposes to rebuild the South Side

plant and will be ready to give out information in about 60 days.

MANITOWOC, WIS.—The freight warehouse of the Wisconsin Central, 900 ft. long, was destroyed by fire Nov. 3. Forty freight cars were burned.

MITCHELL, IND.—The Lehigh Portland Cement Co., Allentown, Pa., is building a new plant at Mitchell. The main building will be 550 ft. long x 112 ft. wide and 35 ft. high. It will be built of concrete and iron by the American Bridge Co. The new plant will have a daily capacity of about 2,200 bbls., and will cost about half a million dollars.

MOUNT VERNON, OHIO.—The Coxey Steel Co., which is building two open-hearth steel furnaces, one of 50 tons and the other of 25 tons, expects to have them in operation soon. It is probable that a number of gas producers will be built for this plant.

NEW CASTLE, PA.—The New Castle Forge & Bolt Co. has recently bought a large site near New Castle for a plant.

NEW YORK, N. Y.—The Manhattan Elevated R. R. will build a new station on the Ninth avenue line in the center of the double curve at 110th street, between Eighth and Columbus avenues. One of the sub-power stations of the company will be at this place, and the station building will be part of that structure. The cost will be about $100,000.

NORFOLK, VA.—G. W. Atkinson and others are interested in a plan to build a $5,000,000 ship building plant and dry docks at Sewall's Point, near Norfolk.

PITTSBURGH, PA.—The plant of Dilworth, Porter & Co., makers of steel rods and railroad supplies, was damaged by fire, Nov. 6, to the extent of about $250,000. The plant, which had an output of 100,000 tons, covered 16 acres of ground on the south side between Fourth and Sixth streets. Seven acres were burned over, and much machinery was destroyed.

The Columbia Iron & Steel Co., makers of steel castings of every description, tell us that they have outgrown their present location and are considering moving to a new locality. Several sites have been considered but nothing is decided upon.

QUINCY, MASS.—The Fore River Ship & Engine Works at Quincy Point proposes to build a number of new buildings, which have already been planned, and a new wharf about 1,000 or 1,200 ft. long.

ST. LOUIS, MO.—The Terminal Association of St. Louis is considering the problem of handling the great crowds expected at the World's Fair in 1903. Several meetings are reported to have been held to consider building new stations, locating yards, etc. The contracts for exposition building will be let soon.

SALAMANCA, N. Y.—An officer of the Erie R. R. writes that the company contemplates rebuilding the passenger stations at Salamanca and Binghamton, N. Y. It will, however, be some months before a decision is made to do the work.

SHARON, PA.—An extension 200 ft. long will be built to the wire nail plant of the Sharon Steel Co., and the wire mill will also be enlarged.

TOPEKA, KAN.—Plans are reported being made by the Santa Fe for a freight depot in Topeka.

WAVERLY, IOWA.—The Chicago Great Western's passenger station and freight house at this place was destroyed by fire last week.

WILMINGTON, DEL.—A report says that the City Council is considering a proposition from the Pennsylvania R. R. which provides for elevating the tracks in the city at a cost of nearly $4,000,000, building new freight yards and car shops. A new passenger station is also included. It is stated the railroad company has bought land near Edgemoor for repair shops.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xvii.)

Pacific Coast Railway Club.

At the meeting of the Club, held on Oct. 19, Mr. W. A. Worthington read a paper on "Some Results of Twenty Years' Progress in American Railroad Operation."

Canadian Society of Civil Engineers.

At the ordinary meeting on Thursday, Nov. 7, Mr. Colpitt's paper on "Economics of Railway Improvements" was discussed. An abstract of a paper on "The Determination of the Critical Velocity of Water," by Dr. E. G. Coker and Dr. H. T. Barnes, was read by Dr. Coker.

North-West Railway Club.

At the meeting of the Club, held at the West Hotel, Minneapolis, Oct. 15, a paper on "Reflections on Steam Distribution for Locomotive Engines" was read by Mr. H. T. Herr, Division Master Mechanic, Chicago Great Western. A paper on "Paint," by Mr. Thomas Madill, of the Sherwin-Williams Co., was read by the Secretary.

Western Railway Club.

The next meeting of the Western Railway Club will be held Tuesday afternoon, Nov. 19, at the Auditorium Hotel, Chicago. Mr. E. M. Herr, General Manager of the Westinghouse Air Brake Co., and T. W. Demarest, Superintendent of Motive Power of the Pennsylvania Lines West, will both present papers on maintaining air-brakes. Also, Prof. G. D. Shepardson will have a paper on combustion.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. G. H. Goodell has resigned as Mechanical Engineer of the Northern Pacific to take a similar place with the Pressed Steel Car Co., Pittsburgh, Pa.

—Mr. D. C. Lloyd, of the James Bridge Steel Works, Wednesbury, England, is in the United States to visit the principal iron and steel and bridge-building plants.

—Mr. R. A. Hamilton, Chief Engineer and promoter of the proposed Toledo & Chicago Transfer, died Nov. 4, after a brief illness. Mr. Hamilton was about 54 years old.

—Lieut. Col. David P. Heap, Corps of Engineers U. S. Army, Division Engineer of the Pacific, has been ordered to report to Gen. Young, commanding the Department of California, at San Francisco, as a member of his staff in charge of engineering works.

—Mr. J. B. Henney, who was recently appointed Superintendent of the Manchester Locomotive Works, succeeding Mr. Howgate, died on Nov. 3, about a week after his appointment. Mr. Henney was about 60 years old and had been connected with the American Locomotive Co. for some time.

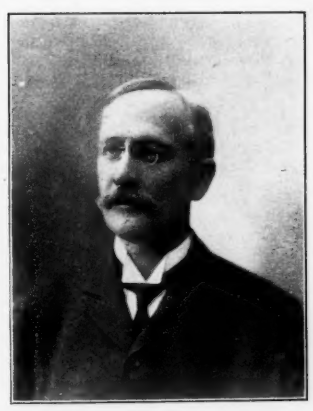
—Mr. Eugene A. Byrnes, Principal Examiner in the Patent Office at Washington, has resigned. Mr. Byrnes is a graduate of Ann Arbor University and has been in the Patent Office for 17 years, working his way up from fourth assistant examiner. He established the class of electro-chemistry in the Patent Office and was in charge of the laboratory there.

—Mr. C. G. Knight, Chief Inspector under the Commissioner of Railroads and Telegraphs of Ohio, died suddenly Oct. 31. Mr. Knight had been connected with the office of the Commissioner of Railroads for about three years. He was born in Sandusky, Oct. 24, 1843, and during the Civil War served in the Eighth and 123rd Ohio volunteers. He was a locomotive engineer for many years previous to his appointment as Inspector.

—Maj. S. S. Leach, Corps of Engineers, has been detached from duty at New London, Conn., and ordered to command the First Battalion of Engineers, now on its way home from the Philippines, and to be stationed at Fort Leavenworth, Kan. Maj. Charles F. Powell, now at Pittsburgh, will relieve Maj. Leach at New London, being relieved at Pittsburgh by Capt. William L. Sibert, now at Louisville, Ky. Maj. E. H. Ruffner, at Cincinnati, will assume charge of the work at Louisville in addition to his present duties.

—Mr. R. H. Wright, who recently became Superintendent of the Richmond, Fredericksburg & Potomac, was born in Virginia, Jan. 22, 1848. His railroad career dates from 1868, when he began as a telegraph operator for this company. Two years later he was made agent, and from 1880 to 1899 he held various positions, such as train despatcher and clerk to the General Superintendent. In May, 1899, he was appointed Acting Superintendent, which position he held until Nov. 1, this year, when he resigned to take his new position as stated above. As will be seen Mr. Wright's entire service has been with the Richmond, Fredericksburg & Potomac.

—Last week we noted the appointment of Mr. Albert E. Mitchell as Assistant Superintendent of Motive Power of the Chicago, Milwaukee & St. Paul. When Mr. Mitchell resigned from the Erie we said something about his previous service; but it will do no harm to repeat the facts briefly at this time. Mr. Mitchell graduated in 1875, as a Mechanical Engineer, from the Maine State College, Orono, Me.; served as apprentice in Baldwin Locomotive Works from March 27, 1876, to Jan. 23, 1877; entered the Altoona shops of the Pennsylvania, Jan. 27, 1877, and served there and in the testing and signal departments of the same road until July 1, 1881. From that time until Nov. 1, 1886, when he entered the motive power department of the old New York, Lake Erie & Western, Mr. Mitchell was identified with the Yale & Towne and other manufacturing concerns and with the New York & New England R. R.; June 1, 1887, he was appointed Engineer of Signals of the New York, Lake Erie & Western and after serving as Engineer of Tests and Mechanical Engineer of the same road, and of the Chicago & Erie, was (April, 1882) made Superintendent of Motive Power of the entire system. When the New York, Susquehanna & Western, New Jersey & New York and Erie & Wyoming Valley roads were made part of the Erie, Mr. Mitchell's jurisdiction was extended to include those lines. Under Mr. Mitchell's administration a very great development has taken place in the motive power and rolling stock of the Erie lines, which development has been pretty well recorded in our columns as it has gone on. Mr. Mitchell has been identified prominently with the work of the mechanical associations and the New York Railroad Club, having served in some official capacity in the last-named organization since 1888.



ELECTIONS AND APPOINTMENTS.

Atlantic Coast Line.—S. LeGrand, heretofore Assistant Auditor, has been appointed Acting General Auditor, with headquarters at Wilmington, N. C.

Boston & Maine.—W. A. Lydston has been appointed Supervisor of Bridges and Buildings, with headquarters at Salem, Mass., succeeding the late H. F. Russell.

Boyne City & Southeastern.—W. T. Rupert, heretofore Master Mechanic of the Pere Marquette, has been appointed Assistant General Manager of the B. C. & S. E., with headquarters at Boyne City, Mich.

Chicago & Alton.—E. Ryder, heretofore Division Superintendent of the Southern, has been appointed Superintendent of the Western Division of the C. & A., succeeding W. H. Starr, assigned to other duties, effective Nov. 11. J. R. W. Davis, Engineer Maintenance of Way, has resigned.

Chicago, Burlington & Quincy.—At the annual meeting the following Directors were elected: Francis W. Hunnewell, of Boston; George B. Harris (President); Charles E. Perkins, of Burlington, Iowa, former President; E. H. Harriman, Jacob Schiff, George J. Gould and H. McK. Twombly, all of New York; President James J. Hill, of the Great Northern; James N. Hill, of St. Paul; J. Malcolm Forbes, of Boston; and Robert Bacon. Possibly (but not probably) some of these names may have been changed at the adjourned meeting held Nov. 14.

Chicago Great Western.—F. N. Risteen, heretofore Division Master Mechanic of the Northern Pacific, has been appointed Assistant Superintendent of Motive Power of the C. G. W., under Mr. Van Alstine, with headquarters at St. Paul, Minn.

Chippewa River & Menomonie.—Wm. Irvine has been appointed General Manager, succeeding H. G. Chichester.

Cincinnati, Georgetown & Portsmouth.—The officers of this company are: Vice-President, C. C. Tennis; Secretary and Treasurer, R. E. Field, and General Manager and General Freight and Passenger Agent, E. W. White.

Denver & Rio Grande.—G. J. Gould has been elected Chairman of the Board; Russell Harding, Vice-President and General Manager; J. M. Herbert, Manager; and S. Little, Secretary.

Erie.—A. M. Mozier, heretofore General Superintendent of the Ohio Division, has been appointed General Agent, with headquarters at Chicago, Ill.

Florence & Cripple Creek.—W. K. Gillet has been elected President, succeeding J. J. Frey.

Georgetown & Western.—E. B. Freeman has been elected Vice-President, and R. L. Montague succeeds Mr. Freeman as General Manager. C. C. Waller has resigned as Traffic Manager and W. R. Buie has been appointed General Freight Agent, in addition to his present duties of General Passenger Agent.

Grand Trunk.—N. B. Whitsel has been appointed Master Mechanic of the Northern Division, with headquarters at Allandale, Ont., succeeding T. A. Summerskill.

Kansas City, Watkins & Gulf.—C. W. Hole, General Freight and Passenger Agent and Superintendent of Telegraph, has resigned.

Kentucky & Indiana Bridge.—W. H. McDoel has been elected President, at Chicago, Ill., and W. M. Greene, Vice-President, with headquarters at Cincinnati, Ohio.

Lake Erie, Alliance & Wheeling.—C. O. Scranton has been appointed Auditor and Assistant General Freight Agent.

Lehigh & Lackawanna (Central R. R. of New Jersey).—H. F. Baker has been elected Secretary and Treasurer, succeeding S. Shepherd.

Mexican International.—W. Mahl has been elected President.

Nevada-California-Oregon.—J. M. Crawley has been appointed Traffic Manager, with headquarters at Reno-Nev., succeeding J. H. Bennett, resigned.

Northern Pacific.—G. H. Goodell, Mechanical Engineer, with headquarters at St. Paul, Minn., has resigned. H. M. Curry has been appointed Division Master Mechanic, with headquarters at Fargo, N. Dak., succeeding F. N. Risteen, resigned. (See Chicago Great Western.)

Quebec Southern.—G. W. Bartlett has been appointed General Superintendent of this company and the South Shore, with headquarters at Sorel, Que.

St. Louis & San Francisco.—At a meeting, held Nov. 11, Mark T. Cox and James Campbell were elected directors, succeeding H. K. McHarg and S. C. Eastman.

St. Louis, Kansas City & Colorado.—J. L. Campbell, with headquarters at Belle, Mo., has assumed the duties of H. L. Marvin, deceased, as Chief Engineer of the Gasconade Railway Construction Co., which is extending the St. L., K. C. & C. The position of Chief Engineer of the railroad company has been abolished.

Southern.—The jurisdiction of N. J. O'Brien, Superintendent of the Danville Division, has been extended over the Washington Division, succeeding E. Ryder, resigned. (See Chicago & Alton.)

Southern Pacific.—The office of Superintendent of Bridges and Buildings (Atlantic System) has been abolished and the duties of that department have been transferred to the several Division Superintendents, who will report to the Engineer Maintenance of Way. D. K. Colburn, heretofore Superintendent of Bridges and Buildings, has been appointed Assistant Engineer Maintenance of Way.

Tifton, Thomasville & Gulf.—R. H. Brown has been appointed Auditor, with headquarters at Thomasville, Georgia.

Virginia & Southwestern.—John Warwick, Purchasing Agent, has resigned.

Virginia & Truckee.—G. W. Safford has been appointed General Freight Agent, with headquarters at Carson City, Nev.

Warren & Corsicana Pacific.—W. J. Spurlock has been appointed Acting Auditor, succeeding W. E. Adams, resigned.

Washington County.—H. F. Burpee, heretofore Assistant General Freight Agent, has been made Acting General Freight Agent.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ALGOMA CENTRAL & HUDSON BAY.—It is said that this road has completed an extension 22 miles long from Achigan, Ont., to Pangassin, and that the Josephine Branch, 11 miles long, from Josephine Junction, Ont., to Josephine Mine, has been opened for business.

ARKANSAS SOUTHWESTERN.—It is reported that this company has taken over the Ultima Thule, Arkadelphia & Mississippi, a line in Arkansas, 28 miles long, which extends from Daleville to Washita. A new branch of the Arkansas Southwestern has been opened between Gordon Junction and Gagetown, Ark., 28 miles.

BATTLE CREEK & MARSHALL (ELECTRIC).—This company has filed articles of incorporation with the Secretary of State in Michigan, with a capital stock of $200,000, to build an electric line from Battle Creek to Marshall, about 12 miles.

BISMARCK, WASHBURN & GREAT FALLS.—Trains are now reported running on the extension between Bismarck, N. Dak., and Washburn, 45 miles. The line is projected on beyond 180 miles to Great Falls. (Construction Supplement, Oct. 11, 1901.)

BLACKWELL, ENID & SOUTHWESTERN.—Work is reported completed on the extension from Parker, Okla. T., to O'Keene, 21 miles west.

CALIFORNIA EASTERN.—Track laying is reported on the extension beyond Manvel which is designed to connect with the Oregon Short Line and San Pedro roads. (Sept. 13, p. 643.)

CALIFORNIA MIDLAND.—The object of this company, which was recently reported as incorporated in California to build a railroad from San Francisco through the San Joaquin Valley to Deadman's Pass, and thence into the State of Nevada, is said to be to reach the iron mine district at Minarets on the waters of the San Joaquin. These mines include 42 locations situated on Iron Mountain at 8,500 ft. elevation. It is said the first step will be the building of a road from Fresno to the mines, and that preliminary surveys have been made. The projected line would also open up a vast timber country. (Oct. 25, p. 745.)

CHICAGO, BURLINGTON & QUINCY.—The extension from Garland, Wyo., 21 miles south to Corbett, has been completed.

CHICAGO, MILWAUKEE & ST. PAUL.—Work is now in

progress on the main line west of Perry, Iowa, lowering the grades at Jamaica, Herndon and Bayard and straightening the alignment wherever necessary. The company is also putting in eight or 10 new side tracks at Herndon, where the new Des Moines Spirit Lake line crosses the main line.

CHICAGO ROADS.—The Track Elevation Committee recommended, on Oct. 31, an ordinance providing for the elevation of tracks on the Grand Trunk, the Chicago Junction, the Panhandle Route, and the Chicago Terminal Transfer, a total trackage of about 30 miles. The work includes 34 subways, and the estimated cost is $800,000.

COAST CYPRESS & RAILROAD.—This company was organized recently in Iowa, for the purpose of buying and selling cypress, pine and other timber, and for the manufacture of lumber, and to build a railroad from St. Marks, Fla., to their timber lands in Wakulla and Jefferson counties, Fla. The capital stock is $150,000 and the principal place of business is Muscatine, Iowa. The officers are: President, William Musser; Vice-President, William Kaiser; Treasurer, J. L. Giesler, and Secretary and General Manager, W. L. Reach, all of Muscatine, Iowa.

JARVISVILLE & TEN-MILE.—The stockholders of this projected West Virginia line, at a recent meeting at Clarksville, W. Va., amended their charter to permit of building a railroad 100 miles long into a coal field of 30,000 acres. It was the previous intention of the company to build from Jarvisville north 19 miles down Ten-Mile Creek to a point on the West Virginia Short Line, near Sardis. J. H. Davis, of Clarksburg, W. Va., is Chief Engineer.

KANSAS CITY, PEORIA & CHICAGO.—A charter has been issued by the Secretary of State of Missouri for a company under the above name, with a capital of $3,945,000, to build a road 263 miles long from Kansas City to Gower, in Buchanan County, and from Kansas City to Quincy, Ill. Among the directors are John W. Gates, Max Pam and Wm. J. Calhoun, of Chicago.

KNOXVILLE, KIMBERLIN HEIGHTS & SEVIERVILLE ELECTRIC.—Charter under this name has been asked for by the new Tennessee company, managed chiefly by Canadian capital, which is to build an electric road between the points named. The total length of the road is estimated at 54 miles, of which 40 comprise the main line, with 14 miles of branches. W. T. Goffe, of Toronto, Ont., and A. S. Johnson, of Kimberlin Heights, Tenn., are interested. (Oct. 18, p. 730.)

LEHIGH & CARBON TRACTION.—This company was incorporated in Pennsylvania, Oct. 31, to build an electric line 15 miles long between the points named, which includes all the towns between Allentown and Walnutport. The capital stock is $90,000.

MANITOULIN & NORTH SHORE.—Tenders have been received by T. J. Kennedy, Superintendent, for clearing right of way on a new line between Spanish River, Ont., and White Fish Bay, a distance of 16 miles; also for furnishing 55,000 ties and 580 telegraph poles. (Oct. 4, p. 690.)

MEXICAN CENTRAL.—The extension which has been building for some time from Guadalajara, in the State of Jalisco, 100 miles south to Zapotlan and on to Colima, is reported completed as far as Tuxpan, 119 miles from Guadalajara. Only 46 miles now remain of the entire projected distance, and when Colima is reached a connection will be made through to Manzanillo on another line. (Construction Supplement, Oct. 11, 1901.)

MINNEOLA, NEW FLORENCE & MIDDLETOWN.—This company has been incorporated in Missouri, to build a railroad 30 miles long between the points named, with the object of making a summer resort out of Minneola. The capital stock of the company is $300,000, and the incorporators are: A. H. Kalkmeyer, Howard Ellis, J. W. Schownerdt, C. H. Rigg and others.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—An officer writes that the proposed improvements of this line in Michigan will include relaying the entire line in that State with 80-lb. rails. About 150 miles of railroad are involved.

NASHVILLE, CHATTANOOGA & ST. LOUIS.—Contract was awarded, Oct. 29, to Brooks Bros., of Molena, Ga., for 2½ miles of the 10-mile extension which is to be added to the McMinnville Branch, and work is to be completed next spring. The McMinnville branch runs at present from Tullahoma, on the main line, to Bon Air, Tenn., 69 miles.

NEW YORK, NEW HAVEN & HARTFORD.—The Massachusetts Railroad Commissioners have approved an issue of 1,500 shares of capital stock by the Old Colony, amounting to a par value of $150,000, the proceeds of which are to be applied to the building of the branch of its line from North Attleboro to a point near Adamsdale on the line of the Rhode Island & Massachusetts (N. Y., N. H. & H.).

NORTHERN PACIFIC.—It is reported that the Division Engineer at Tacoma, Wash., will open bids shortly for work on the Scappoose Branch, which is projected from Scappoose, Ore., 21 miles west to Pittsburgh, Ore.

NORTH TENNESSEE COAL & LUMBER.—This company, incorporated by Gov. Benton McMillin and others, is to build a railroad 12 miles long into coal and timber lands which it is desired to open up in Fentress and Pickett counties. Owing to the rough country the cost will be heavy.

NOVA SCOTIA ROADS.—It is reported that Leckie & Collins, contractors of Pittsburgh, Pa., have been awarded the contract to build a railroad 50 miles long on Cape Breton, Nova Scotia.

OKLAHOMA, TEXAS & GULF.—A company by this name was incorporated at Oklahoma City, Okla. T., Nov. 7, by Albert T. Yerkes, of Chicago; Harold Berry, of New York and others. The proposed route of the new line is from Kingfisher by way of Oklahoma City and Coalgate, Ind. T., to Paris, Texas, a total distance of about 180 miles.

PENNSYLVANIA.—Right of way is reported secured for improvements at Bristol, Pa., including a new passenger station and bridges over Jefferson street, and Pine Spruce and Bath streets. By these proposed changes the projected new line through Bristol will be located, in some places, about half a mile northwest of the present track, and will be practically a straight line.

It is reported that the company will build a connecting line between Stoneboro and Oil City, running from Stoneboro down the Big Sandy Creek to the Allegheny River near Franklin, where a bridge is to be built to connect with the Allegheny Division which runs to Oil City. The distance between Stoneboro and Franklin is about 15 miles and the Lake Shore & Michigan Southern has a line in operation between these two points.

REPUBLIC & GRAND FORKS.—Work has been begun on this new line from Republic, Wash., north to the International boundary near Nelson, B. C. The company was incorporated last year and contract let to George S. Deeks & Co.

ROCHESTER, SYRACUSE & EASTERN (ELECTRIC).—This company was incorporated at Albany, Nov. 7, with a capital stock of $3,500,000, to build an interurban line 100 miles long between Syracuse and Rochester, passing through numerous towns in Onondaga, Cayuga, Wayne, Ontario and Monroe counties. The directors are: Ferdinand W. Roebling, Trenton, N. J.; Clarence W. Seamans, New York City; Frank C. Soule, Syracuse, and others.

SAN PEDRO, LOS ANGELES & SALT LAKE.—Contracts for the concrete work on all culverts and bridges for this new line between Los Angeles and Pomona, 30 miles, were let Nov. 1. The contract price is about $200,000 and includes abutments for six large structures and nearly 200 smaller ones crossing the numerous water courses in the San Gabriel Valley. (Oct. 4, p. 690.)

SEABOARD AIR LINE.—Contracts are reported let for the projected line of the Charleston, Augusta & Chattanooga between Charleston and Augusta. Work is to begin at once at Olar Station, S. C., where the Seaboard Air Line crosses the proposed line, and it will proceed in both directions at the same time, giving the Seaboard eventually entrance to Augusta and Charleston over its own tracks. The distance from Olar to Charleston is 83 miles southeast, and from Olar to Augusta, 50 miles northwest.

SOUTHERN PACIFIC.—An officer writes in regard to the proposed branch around the southern end of Salt Lake into Toole County, that no decision has as yet been made about building. (Nov. 1, p. 764.)

TEMISCAMINGUE.—It is reported on good authority that the Government of Ontario will build next spring the proposed line from North Bay into the Temiscamingue District. A charter for a line between North Bay and James Bay was held by Mackenzie & Mann, but, owing to the very slow progress made by them, it is thought that the Government will take the matter into its own hands next year. (Oct. 11, p. 712.)

TERRE HAUTE & INDIANAPOLIS.—It is reported that the Vandalia Line will commence work at once on a double track from East St. Louis, Ill., to Collinsville, a distance of 13 miles. It is probable that the double track will be extended further east by the time of the St. Louis World's Fair in 1903.

TOLEDO & NORTHWESTERN.—Amended articles of incorporation have been filed in Ohio, increasing the capital stock from $200,000 to $350,000, to permit the company to extend its line from Albion to a junction of the Lake Shore & Michigan Southern and the Cincinnati Northern railroads at Hanover, Ohio.

TRANS-APPALACHIAN.—Surveys are reported completed for this projected line in North Carolina and Tennessee, from Lincolnton, on the Seaboard Air Line, across the Blue Ridge to Butler, Tenn. It is estimated that the line, when completed, will cut 100 miles from the haul of coal from the Tennessee mines to the North and South Carolina coasts.

WABASH.—An officer writes in regard to the proposed betterments of the newly acquired Omaha & St. Louis, that it is thought that the company will make considerable expenditure on the line within the next year, but detailed information is not yet available. (Nov. 1, p. 764.)

GENERAL RAILROAD NEWS.

ALABAMA & TENNESSEE RIVER.—A mortgage for $1,600,000 was filed for record, Oct. 31, with the Knickerbocker Trust Co., New York, to secure bonds for building this projected line from Florence to Clifton, Tenn., 80 miles. The Alabama & Tennessee River R. R. Co. was formed to consolidate the Tennessee & Northwestern and the Florence & Northwestern Co., and to build from Florence, Ala., into Wayne County, Tenn.

BOONE, ROCKWELL CITY & NORTHWESTERN.—Amended articles of incorporation of the Marshalltown & Dakota Co. were filed with the Secretary of State of Iowa recently changing the name of the company to the above. The capital stock was also reduced from $2,000,000 to $1,500,000.

BUFFALO, ROCHESTER & PITTSBURGH.—The President has sent a circular to the holders of preferred and common stock stating that the holders of the outstanding $1,000,000 debenture bonds have offered to reduce the interest on their holdings from 5 to 4 per cent., provided that they are made convertible into common stock at par, subject to the conditions that the bondholders who desire to exercise this right shall give proper notice, and that all or any of such bonds may be redeemed at the option of the company on any interest day at a 2½ per cent. premium. The directors approve that this offer be accepted and further recommend that the balance of $2,000,000 debenture bonds authorized in 1897, be made convertible and redeemable on the same terms; these bonds, when issued, to be offered for subscription to the stockholders of the company. The questions of accepting these recommendations and of authorizing an increase of common stock to the amount of $3,000,000, will be voted on Nov. 18.

CHAMPAIGN & SOUTH EASTERN.—The trustees of this company filed a suit at Springfield, Ill., to foreclose a mortgage made in 1881. This mortgage was made as security for bonds issued by the Wabash, St. Louis & Pacific, the predecessor of the Wabash, at the request of the Champaign & South Eastern, and delivered to that company to be used in payment for its construction and equipment, to the amount of $174,000. The road runs between Champaign, Ill., and Sidney, Ill., 12 miles.

CINCINNATI SOUTHERN.—The vote of the people on the question of extending the lease of this road to the Cincinnati, New Orleans & Texas Pacific (Southern) was held at Cincinnati recently. The majority in favor of extension of the lease was very large and it will therefore be continued until 1966. It was also voted to issue $2,500,000 of city bonds, at the rate of $500,000 per annum, for improvement of the road's terminals.

DETROIT UNITED RYS. (ELECTRIC).—At a recent meeting of the directors, H. A. Everett, E. W. Moore and R. A. Harmon were appointed syndicate managers to arrange the consolidation into one company of the various properties recently acquired in Michigan.

IOWA & ST. LOUIS.—A meeting of the shareholders of this company will be held in Kansas City, on Dec. 30, to vote on a proposition to increase the capital stock by $700,000, to provide for an extension from the present terminus of the line north through Putnam and Schuyler counties in Missouri, and Appanoose County in Iowa, to a point at or near Centreville, Iowa; also in a southerly direction through Adair and Macon counties, Mo., to a point at or near Elmer, Mo., a distance of about 50 miles. The proposition to issue bonds at the rate of $15,000 per mile of road constructed, to aid in building the line, will also be voted. The company was incorporated last spring with $50,000 capital stock, to build a line five miles long from Novinger, on the Omaha, Kansas City & Eastern, to Sibley Point.

KANSAS CITY SUBURBAN BELT.—A decree of foreclosure and sale of the properties of the above company, the Consolidated Terminal, the Union Railway and the Kansas City & Independence Air Line, was issued in the Federal Court at Kansas City, Nov. 6. These properties comprise what was known as the Kansas City System of Terminals originally used by the Kansas City, Pittsburgh & Gulf R. R., now the Kansas City Southern. Foreclosure is made under suits brought by the Providence Life & Trust Co. against the different companies involved, to cover mortgages to the amount of $4,050,000. The date for the sale is set as Jan. 1, 1902, and S. C. Douglas is named as Special Commissioner to conduct the sale.

KINGSTON & CENTRAL MISSISSIPPI.—The Mississippi Railroad Commission has been notified that negotiations are in progress for the consolidation of the above named road, which is projected from Laurel, Miss., 45 miles north to Montrose, with the Mobile, Jackson & Kansas City, and it is thought arrangements will be concluded within 30 days. At last reports the Kingston & Central Mississippi was completed for 15 miles, and contracts were let for 10 miles beyond. (Construction Supplement, Oct. 11, 1901.)

LOGANSPORT & TOLEDO.—It is announced that the Pennsylvania and Lake Shore Companies will combine to establish a through route between Toledo and St. Louis, making use of the Logansport & Toledo (formerly the Eel River) road recently purchased by the Pennsylvania. This proposed route is about 16 miles longer than that operated by the Wabash.

LONG-BELL RY.—This company has been formed in Louisiana as a consolidation of the Sibley, Lake Bisteneau & Southern, the Woodworth & Louisiana Central, the Hudson River, and the Louisiana Pacific Railroads. The Woodworth & Louisiana Central is a new line 18 miles long which extends from the Rapides Lumber Company's mill at Woodworth, La., toward the Saline River, and was reported as completed for six miles in October.

MARSHALLTOWN & DAKOTA.—See under Boone, Rockwell City & Northwestern.

MEXICAN NORTHERN.—This property is said to have been acquired by the Pierce Syndicate, which is in control of the Mexican Central. It is stated that it will be used in connection with the new line to be built by the Fort Worth & Rio Grande to make a through route from Kansas City and St. Louis to the City of Mexico.

MICHIGAN CENTRAL.—J. P. Morgan & Co. are advertising for sale $2,000,000 3½ per cent. 50-year gold bonds, secured by first mortgage on the Jackson, Lansing & Saginaw R. R., at 107½ plus interest. The bonds are a legal investment for saving banks in the State of New York, and the mortgage by which they are secured is a first and only mortgage on the main line of the Jackson, Lansing & Saginaw, at a rate less than $6,000 per mile of road. The road has been under lease for over 25 years in perpetuity, to the Michigan Central, and the last-named company will hereafter pay interest on the bonded indebtedness of the Jackson, Lansing & Saginaw, and 3½ per cent. on its capital stock of $2,000,000. By the reduction of interest on the bonded debt under this new issue of bonds, the rental will be reduced. The issue of these bonds is in accordance with the policy adopted by the company to refund the bonds issued under the different mortgages, as such bonds may fall due, at a rate of 3½ per cent., or better.

NORTHERN PACIFIC.—It is reported now that the basis of an agreement has been reached between the Hill-Morgan interests and the Harriman-Kuhn-Loeb & Co., and the Union Pacific interests providing for the sale by the latter of their Northern Pacific majority holdings and full satisfaction and protection to the Union Pacific regarding the Chicago, Burlington & Quincy. It is said that two proprietary companies are to be formed, one of which will hold the stock of the Northern Pacific and Great Northern, while the other will lease and operate the Burlington. The Union Pacific, although it will hold no financial interest in the latter, is to have a one-half representation in the control.

RUTLAND.—It is said that the directors of this company have voted to consolidate with the Chatham & Lebanon Valley R. R., and to issue $3,500,000 additional preferred stock to provide for new rails and other improvements.

This company is in control of the South Shore, which has recently been absorbed by the Quebec Southern, and under the new plan a railroad known as the Montreal & Quebec Southern, is to be formed by a consolidation of the old Quebec Southern and the South Shore and Rutland lines. Entrance into Montreal has been arranged, it is said, through an agreement with the Canadian Pacific, in accordance with which the new consolidation will enter Montreal at the C. P. R. Windsor station. (Nov. 1, p. 764.)

SUMMIT BRANCH.—A deed of sale of this property, by which the Girard Trust Co. and the Summit Branch Coal Co. transferred to John G. Wilson, of Philadelphia, the line of the Summit Branch road in Schuylkill and Dauphin counties, Pa., was placed on record Nov. 4, at Pottsville, Pa. The consideration was $700,000. The Summit Branch has been operated by the Northern Central, which is a part of the Pennsylvania System.

WESTERN MARYLAND.—The directors of this company for the city of Baltimore have made a report to Mayor Hayes which contains two recommendations, one of which is that the city's advances for the payment of interest and purchase of coupons to the amount of $3,920,676 be funded into a preferred stock of the railroad company, and that the interest on the advances, amounting to $3,532,009 additional, be funded into the common stock of the company. The second proposition, in lieu of the one just given, is that the road be sold at public auction under the mortgage liens held by the city. The total funded indebtedness of the company to the city, Sept. 30, 1901, is stated as $4,622,576. In connection with these propositions the directors' letter contains the following paragraph: "We consider it of primary importance that the relations between the railroad company and the city as to the debt due by the railroad to it, should be accurately ascertained and stated as the basis of any future consideration as to the disposition of the city's interest." (Oct. 18, p. 730.)